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THE AUTOMOBILE

Motor Truck Aids the "Drummer"

Automobile vs. Pullman Car as Trade Getter

Selling goods, using as a means of transportation for salesman and merchandise an automobile truck, will probably be the next big development of usefulness in the commercial life of the country. The following story tells briefly what may be expected from the use of the truck in this way. The figures are approximately true, although they lean slightly toward a conservative estimate. The nub of the whole matter is the fact that the truck at 10 miles an hour is twice as fast as all other means of transportation and that at considerably less cost the salesman in the truck can sell as much merchandise in three months as he could in six months by means of rail, boat and wagon.

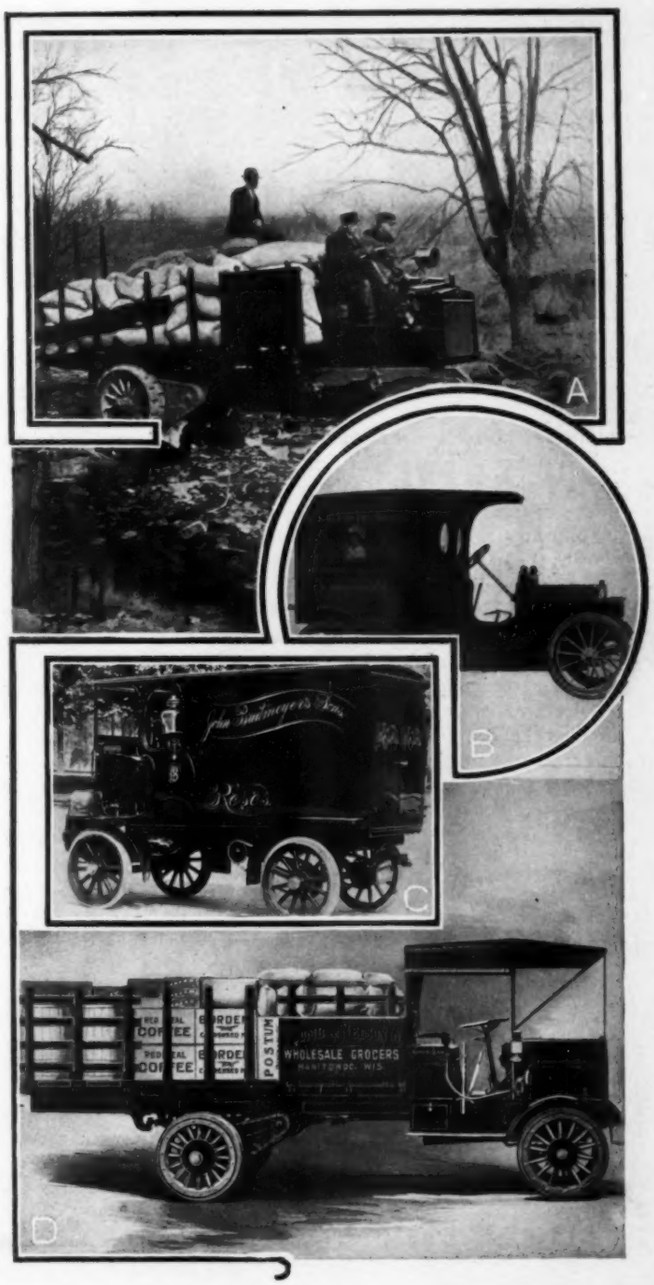
SALESMEN who are in position to display their wares directly to customers and prospective customers dispose of more goods many times over than they would if they relied upon correspondence, even where they and their lines are well-known to the buyers.

The undeniable truth of that assertion is proved in a thousand different ways, but one is enough to show that it is so. The sales record of the drummer who carries a line of samples is always far in advance of that turned in by one who is not so equipped, providing, of course, that the men are of substantially equal ability and their lines are similar.

Catalogues have their use undoubtedly, but they do not take the place of the salesman. In the first place they are usually made up by the advertising departments of the concerns that issue them and are constructed rather with the idea of looks than for the purpose of really illustrating the line of goods. The men who make the catalogues rarely possess definite data covering the goods and when they have the use of it is still more infrequent.

But the drummer who can spread out specimens of the actual stock he is engaged in marketing has something definite to present. He does not have to tell of beautiful coloring, workmanship, style and price, for the specimens themselves speak a more forceful language to the buyers than anything yet devised for the human tongue.

Having demonstrated that actual presentation is far better for sales than correspondence or catalogues or a combination of the two, it remains to discover a better way to make the presentation than is contained in the method of carrying half a ton of excess baggage and being dependent upon railroad service. Railroad passenger rates are high, from the viewpoint of the concern that foots the bill. Train service is frequently arranged



A—Sampson truck
B—McIntyre Model V
C—Grabowsky power wagon
D—Kissel Kar Freight automobile

WHAT THE TRIP ACCOMPLISHED.

Total miles traveled	3479.3
Total towns visited	486
Total customers seen	974
Average miles per week	267.6
Average miles per day	44.6
Average towns per week	37
Average towns per day	6
Average calls per week	75
Average calls per day	12.5

* * *

on schedules that seem to have been framed for the purpose of promoting profanity on the part of traveling salesmen.

For instance, where a drummer has "made" a small town, nineteen miles up a branch road, to visit one customer he is quite as likely as not to find that there is no train out of the isolated village by which he can make connections on the main line so as to visit any other customer during the day. If he is able to sell a bill of goods of $1,000 and make a profit for his house of 6 per cent. it would pay something to make the trip and lose the whole day. On the other hand, a sale totaling $100 would represent a dead loss to the house.

The answer seems to be the 1,000-pound freight wagon, equipped with solid tires, and the reason for it may be found in the following account of a three-months' trip, starting and ending with New York City.

The car used may be any excellent automobile, constructed with the idea of commercial service in the delivery and transfer of goods and susceptible to equipment with light, solid tires and having a carrying capacity of about 1,000 pounds. The salesman needs no helper, driver or mechanic, but should be reasonably familiar with the operation of the car. He can gain all the necessary skill and information in one week of intelligent observation and a small amount of practice. For the purposes of this article it is assumed that the man is qualified to drive the car, both in a legal and an actual sense.

Having received his expense money and loaded up his car at the warehouse of his company, taken on his light steamer trunk, which should contain, besides his regular clothing, a rain-proof outfit, he slips copies of the Official Blue Book, Volumes 1 and 2, into the holder in front of the seat and waves good-by to his sales manager. He reaches Columbus Circle at 8:30 o'clock in the morning and threads his way northward to 145th street where he turns right and crosses over the Harlem river.

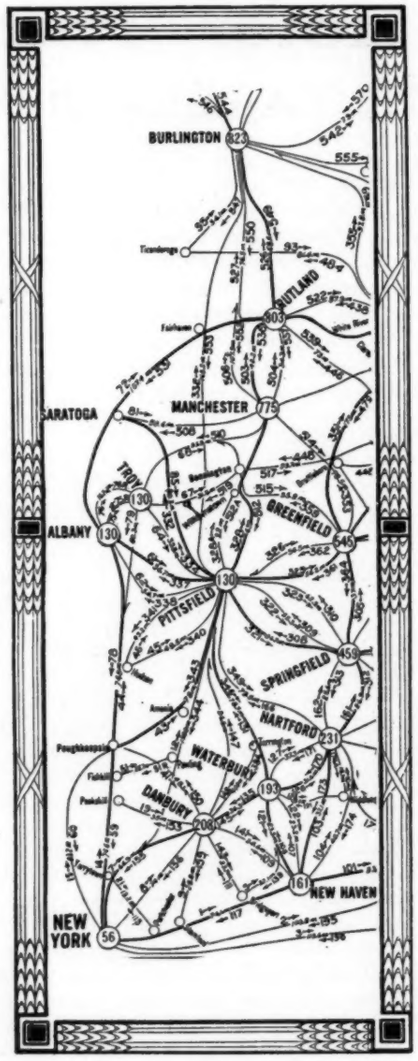
Following route No. 1 of Volume 2 of the Blue Book he reaches the old White Plains road, and when his odometer reads 10.6 he turns diagonally to the right on the new macadam road. His first scheduled stop is at New Rochelle, 16.7 miles from the starting point. It is 10:30 o'clock when he pulls up in front of the establishment of his first customer. New Rochelle is close to headquarters and the particular merchandise that the customer is interested in is known beforehand to the salesman. In half an hour he has transacted his business and in the next hour covers the other three possible customers. When he has concluded his work in this place it is noon and he trundles the car over to the Pepperday Inn and has his luncheon.

At 1 o'clock he takes up his journey again and continuing straight out the road passes Larchmont at 18.5 and continuing to Mamaroneck, where a half-hour is spent in canvassing a customer. From there to Portchester, a matter of 5.4 miles, is on the Post road for some distance. There are two customers in Portchester and it is 3:30 o'clock before he is ready to proceed to Greenwich, Conn., after crossing the Byram river, the state line. At Greenwich there are two customers and it is 5 o'clock when he takes the road to Stamford, Conn., where his first night stop has been scheduled at the Carlton Hotel.

The total mileage for the first day is 33.7 and he arrives at Stamford in plenty of time for dinner. He has canvassed four towns since the start, seeing nine customers, displaying his goods directly to them in the most forcible and persuasive way.

Before he goes to dinner he takes the car to Bell Brothers' Garage, and after seeing that it is carefully housed and ordering the automobile washed and filled up with gasoline and oil, he betakes himself to the hotel.

There are five possible customers for his line in Stamford and consequently it is 9:30 o'clock before he starts out on the road from the garage. Following the main road eastward he crosses the Noroton river, reaching Darien. There is one merchant to interview here and before 10:30 he is on his way to Norwalk. There is enough business possible to keep the salesman engaged until noon when he repairs to the Norwalk Hotel for luncheon, having made seven business calls during the morning. In the afternoon he "makes" Westport, Southport and Fairfield, in each of which places there is a single call to make and reaches Bridgeport, 22 miles from Stamford, early enough in the afternoon to canvass six merchants before dinner time. He stores his car at the Blue Ribbon Garage and registers for the night at the Stratfield.



E—Map of Eastern New York and part of New England

Sixteen potential customers have been interviewed during the day at seven different towns and the salesman is all ready for an early start on the following morning. It is about three miles to Stratford and nearly five from there to Milford, but both places were good business points for the salesman and it was just before noon when he pulled into New Haven and had luncheon at Heublin's restaurant. After lunch he was busy until the end of the business day in visiting his trade and possible customers in New Haven. When he had completed his work, he drove the car around to Dill's Garage and then registered at the Hotel Taft. He only made 17.5 miles, visited the merchants of three cities, including the big town of New Haven.

In three days he had made 73.6 miles.

Early on Thursday morning he started out from New Haven for Waterbury, a distance of 23.3 miles, following Route 106

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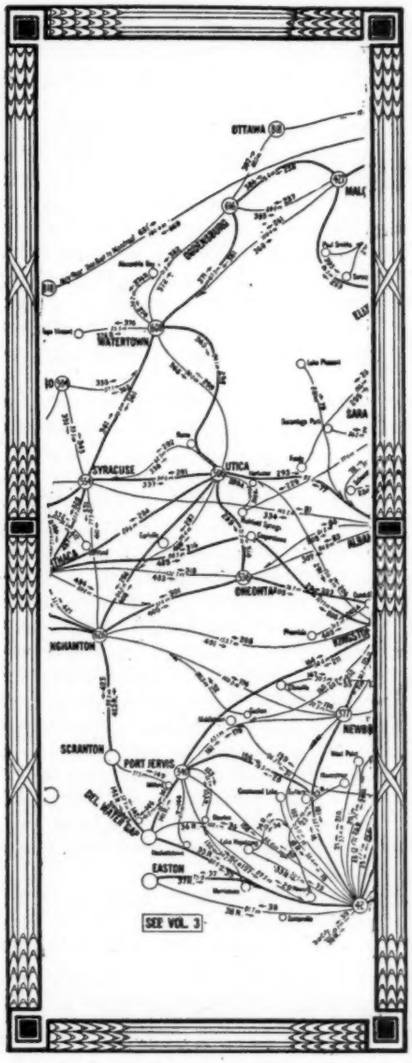
AS TO THE DEPRECIATION OF THE CAR

3,479 miles would have small effect on light solid tires.
If the limit of speed essayed was 10 miles an hour it would be almost nothing.
Likewise, the moderate rate of speed would not rack the mechanism.
Barring accident and wilful injury, the car would be worth practically as much for service at the end of the trip as it was at the beginning.
At moderate speed the life of good solid tires is not far from 20,000 miles.

of Volume 2 of the *Blue Book*. After the worn macadam, with which the roads of the preceding three days had been paved, the good dirt roads leading up into the hills were a relief, although our salesman had not tried to make much speed, even where the roads were good. About two and a half miles out he came to West Rock; made a call at a factory on the roadside, less than a mile farther along, and then followed the main thoroughfare into Seymour, 11.1 miles from the starting point. He put in an hour talking to customers there and nearby and taking the road again reached Naugatuck in plenty of time for luncheon. He made a side trip to Middlebury and Woodbury over a magnificent road about twelve miles long. At Woodbury the salesman picked up Route 145 and making stops only at North Woodbury and Watertown, reached Waterbury, making the total day's run 43 miles. It had been a busy day, with fifteen calls and eight towns, and he was tired when he rolled the car into the E. H. Towle Company garage and went over to the Elton Hotel for dinner and rest.



F—Map of Mohawk Valley Region.

Waterbury occupied his attention early the next day and about 10 o'clock he started toward Danbury. He followed Route 145, which is the reverse of Route 135. Consequently, the first few towns had been covered on the previous day and his first call was at Southbury, 182 miles from Waterbury. Sandy Hook and Newtown were the chief points touched and he was able to reach the Green Hotel in Danbury for a late luncheon. This is 35.1 miles from Waterbury. He found rather a large field in the town where the hats come from and was busy with the trade all the afternoon. He found accommodations for his car at the Green Garage and spent the night at the hotel.

Saturday being a short business day he ran down to Branchville and Wilson, 15.9 miles, by Route 158, and returned to Danbury to spend Sunday.

During the afternoon he went over the mechanism of his car, tightening a few nuts and adjusting a loose fender, which was all that he found amiss.

During the week he made 183.1 miles, to which must be added 24.5 miles accounted for in visiting the trade. He made 67 business calls in 28 cities and towns. Supposing that he "sold" the usual percentage of three out of every five merchants interviewed and that his orders averaged $100 each, his order book would show 40 orders for merchandise costing the buyer $4,000. It would be small business in a sense, but it would constitute a class of trade that could hardly be reached in any other way so as to produce the commendable total of sales. Without the use of the car it would require an active man several weeks to cover all the points described, using the railroads wherever possible and a wagon truck where there was no railroad.

COST OF THE TRIP BY AUTOMOBILE.

For gasoline, 217 gallons at 20 cents	$43.40
For oil, 10 gallons at 80 cents	8.00
For three months' insurance of car	12.00
Repairs and replacements	24.35
Garage (78 washings and 90 nights' storage)	169.00
Hotel	180.
Meals	270.
Incidentals	50.
Total	$756.75
Salary of salesman at $150 month	450.00
Total cost of selling	$1206.75

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The second week of the trip started from Danbury Monday morning and the first day was occupied along the way to Poughkeepsie, N. Y., 45.1 miles via Route 150. This passed through Mill Plain, Conn., crossing into New York before reaching Brewster. En route he stopped at Carmel, Ludington, Stormville, Hopewell Church, Fishkill Plains, New Hackensack and Red Oaks Hill, reaching Poughkeepsie early in the afternoon. He stopped at the Nelson House and put up his car at Ryder's Garage, near the hotel. He made ten towns during the day and visited eighteen customers.

His next objective point was Pittsfield, Mass., and consulting his *Blue Book* he found that the best roads were described in Route 43 of Volume 2. Tuesday morning he left Poughkeepsie, taking a northeasterly course through Pleasant Valley, Washington Hollow, Millbrook to Amenia, where he lunched at the Gates House and filled up his gasoline tank at the Amenia Garage. In the afternoon he stopped at Millerton, Lakeville, Conn., and Salisbury, making 40.7 miles during the day and reaching the White Hart Inn by dinner time after canvassing the town.

Wednesday he made South Egremont, Mass., Great Barrington and Stockbridge in the morning, taking his lunnch at the latter place at the Red Lion Inn. Before coming to Pittsfield he visited Lenox, a busy place, and reached night control before 3 o'clock. At Pittsfield he found a lot of business and it was almost dark when he put his car into the garage of the Central Automobile Company and registered at the Wendell House. His mileage for the day was 37.3. Five towns had been canvassed and eleven orders had been taken from nineteen customers.

Thursday saw the route from Pittsfield to Greenfield, Mass., 58.1 miles, made without difficulty, touching Dalton, Hinsdale, East Windsor, Cumminton, Lithia, Goshen, Williamsburg, Haydenville, over the rather heavy grade which has caused so much woe to automobilists in Winter, thence to Whateley Center, South Deerfield and into Greenfield. There are eleven stops in this itinerary and eighteen customers were seen. He registered at the Weldon, putting his car into the hotel garage.

The next day the run was to Springfield, Mass., 37.0 miles via Route 364. The towns covered were Deerfield, South Deerfield, Northampton, Holyoke and thence to Springfield. He stopped at the Adnabrown after garaging his car at the Woodbury Garage.

Saturday's itinerary was short, consisting of a run 25.6 miles long to Hartford over Route 313. This touches Windsor Locks

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COST BY OTHER TRANSPORTATION

Railroad and boat fare	$98.00
Wagon and buggy hire	52.00
Hotel	360.00
Meals	540.00
Incidentals	100.00
Total	$1150.00
Salary of salesman at $150 month	$900.00
Total cost of selling	$2050.00

TRADE POSSIBILITIES OUTLINED

If the salesman closed with 60 per cent. of his customers his total sales would number 585

If the orders averaged $100 each, his total business would amount to about $58,500

If the percentage of net profit on these sales was 6 per cent, the profit of the trip would be $3,510

Many of the best localities for trade reached on this trip are isolated from railroads and water transportation

Making the same towns and same trade by railroad, boat and wagon would require not less than six months

HOW IT WOULD AFFECT NET PROFITS

If the net profit using the car is	$3,510.00
It would mean a profit of (per mile)	1.01
As the cost by rail, etc., is $843.25 greater than by car the net profits on the same basis of mileage would be	2,666.75
This would mean a profit of (cents per mile)	.77
The difference in favor of the car would be (cents p.m.)	.24
The difference in time would be (months)	3
The difference in interest charge on the goods sold due to the extra time required would amount to	438.75
This item deducted from the net profit would leave	2,228.00
Thus the car would increase the profit of the house by	1,282.00

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and Windsor before reaching the Connecticut capital city where the salesman put up at the Allyn House, having seen the car safely placed in the Palace Automobile Station.

During the week the salesman covered 223.8 miles on the road and 31.6 miles around the various towns, visited forty-one cities and villages and saw 86 customers.

Monday morning of the third week saw the salesman on his way to Waterbury via Route No. 171, which calls for 37.1 miles and covers eight busy little towns that had not been reached before. Tuesday, having covered Waterbury on a previous trip, he started early via Route 131 for Pittsfield, Mass., 78.7 miles. As several towns on this route had been touched before, he was able to make his destination with ease. Wednesday he went to Springfield, Mass., using Route 321, which took him over the celebrated Jacob's Ladder, 1,810 feet above sea level. This route is 56.7 miles. Returning he took Route 309, 55.3 miles, over Peru Mountain, reaching Pittsfield for dinner. Friday he started for Saratoga, N. Y., over Route 332, which is 80.3 miles long. Friday night he stayed at Hoosick Falls, N. Y., and on Saturday pulled into Saratoga about noon. He put up his car at Ketchum's Garage and registered at the Grand Union Hotel at the celebrated watering place. His mileage for the week was 308.1 on the roads and 26.5 in the towns. These numbered forty-three and he made seventy-six calls of a business nature.

The fourth week of the trip opened with a run to Manchester, via Route 81, which outlines a new way to enter New England from Saratoga. The mileage is 50.6. One of the interesting things about this route is that it leads directly through the battlefield of Saratoga, where Burgoyne and his Hessian mercenaries were captured. Manchester, Vt., is a rather lively town from the viewpoint of the salesman's business and the rest of the week was spent in making side trips from Manchester as a base. These included the following: To Rutland on Tuesday via Route 504, 34.3 miles. Wednesday returned to Manchester via Route 536, 42.2 miles. Thursday he took Route 514 as far as Brattleboro, 52 miles. Friday swung west to Bennington, following a part of Route 448 from Brattleboro, 41.1 miles. Saturday he covered that portion of Route 328 between Bennington and Manchester, 23.3 miles.

He made 243.5 miles on the roads and 21.9 miles in the various towns, which numbered thirty-eight. He saw sixty-seven customers during the week. He made his headquarters during the week at the Hotel Equinox.

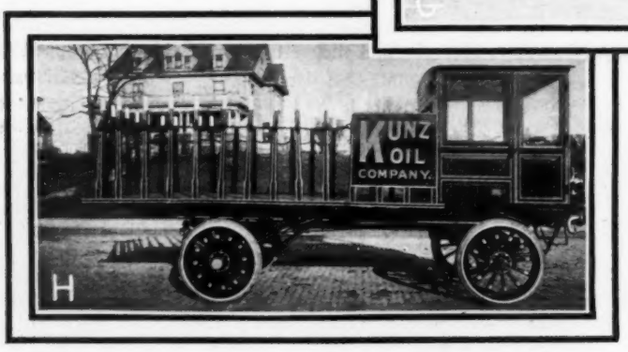
The fifth week saw some distance touring. Monday he started for Burlington, Vt., following route 506, which is 107.9 miles in length. He reached Burlington Tuesday night, stopping at the Van Ness House. Wednesday he took Route 547 to Ticonderoga, 54.1 miles. Thursday he cut across eastward over route 93 as far as its intersection with Route 553, which is about 12 miles. Then he turned south on Route 553 to Fairhaven, about 39 miles. Friday he proceeded to Saratoga, following that portion of Route 531 which lies west and south of Fairhaven and is 53.5 miles. Saturday he continued on Route 531 to Albany, 37.6 miles.

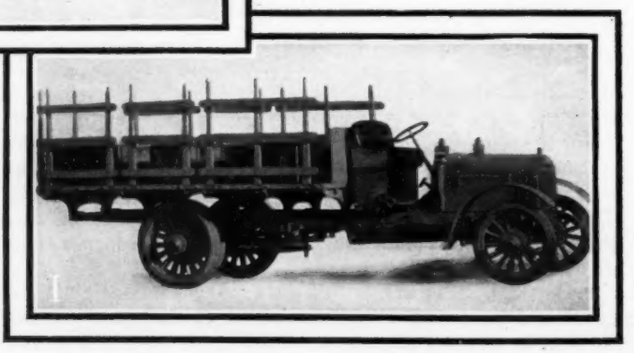
The fifth week covered 292.1 miles by road and 20.4 miles in town. He stopped at forty-three places and made eighty-seven calls.

The sixth week was spent in making two round trips to and from Albany, where he stopped at the Hampton Hotel. These trips were to Pittsfield, Mass., via Route 61, 36.7 miles, and return via Route 338, 54.7 miles; to Hudson by Route 78, 33.1 miles; Thursday to Pittsfield by Route 46, 49.2 miles; Friday to Troy via Route 334, 39.8 miles, and Saturday spending most of the day in Troy and returning to Albany over Route 76R, 16.2 miles.

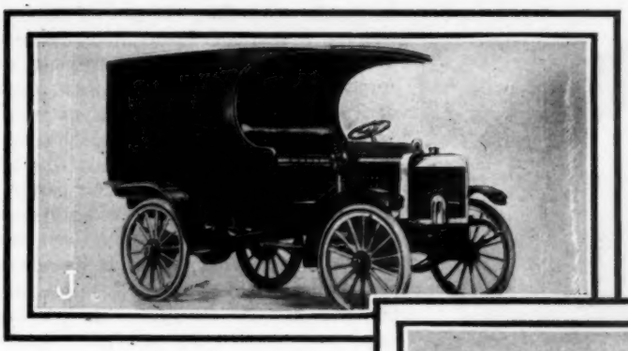
This week he covered 229.7 miles on the roads and 188 miles in towns; stopped at forty places and visited sixty-eight members of his trade.

This finished the eastern portion of his campaign and as he was scheduled to remain in the field for three months, his next move was to proceed deliberately up the Mohawk





H—Wilcox truck G—Jackson delivery wagon I—Pierce-Arrow 5-Ton Truck



J—Oliver delivery wagon

K—Packard Truck

L—Gramm Delivery Wagon

valley after one week spent in canvassing the section that lies west of Albany. This was accomplished in a series of trips touching Oneonta, 84.9 miles, via Route No. 83 Volume 1 of the *Blue Book*. Thence he went to Catskill, 76.7 miles, over Route 305, thence back to Albany, 35.9 miles, via Route 201. This encompassed a mileage of 195.5.

The eighth week of the trip was used in zigzagging across the Mohawk valley, starting from Albany and reaching Utica on Saturday afternoon. The routes and mileages he followed were these: Route 77 to Utica, 95 miles, with side trips over Route 72, which ends at Saratoga and returns to the main line via Route 229 to Richfield Springs, 72.4 miles, thence to Utica, 29.6 miles, via Route 310A. The mileage for the week was about 240. He stopped at the Yates Hotel.

In the ninth week he made the trip to Watertown, following Route 298, which is 94.1 miles; made a side trip to Alexandria Bay, going over Route 374, which is 34.2 miles, and returning by Route 382, which is slightly less. He came back to Utica via Route 366, which is 80 miles. The week covered about 240 miles.

The tenth week was used in a series of short trips around Utica. These were to Oneonta, 71.7 miles, via Route 289, to Binghamton, 61.4 miles, Route 301, and back to Utica, 94 miles by Route 408. This totaled 227.1 miles.

The eleventh week was spent in covering the State via Route 281 Syracuse, 50.6 miles; Route 343 to Oswego, 35.3 miles; Route 358 to Rochester, 70.6 miles; Route 516 to Syracuse, 88.3 miles, and back to Utica by Route 338, which is 62.3 miles, making a total mileage of 307.1.

The next to the last week was a lively one. It was from Utica to Ithaca, Route 284, making 89.6 miles; to Auburn, 40.8 miles, Route 492, returning to the Cornell town via Route 491R, 37.8 miles; to Elmira, 33 miles, by Route 498. He covered 201.2 miles.

The last week of the trip was from Elmira to Binghamton, Route 431, 63.6 miles, to Kingston, 153.7 miles; Route 401 and back to New York via Newburg, covering Route 214 to Newburg, 36.2 miles, and Route 181 to New York, 58.2 miles, thus making a mileage of 311.7 at the finish.

The cost of the trip closely estimated is shown in the tables that are contained herewith.

Any size of truck could be used in the same way that has been outlined for the 1,000-pound wagon and the cost could be closely estimated. For trucks of equal size, the operation of the more perfect specimen would be less than that of the less perfect. A truck of moderate cost might prove to be the best for some kinds of work, while the most highly priced car would be better for others.

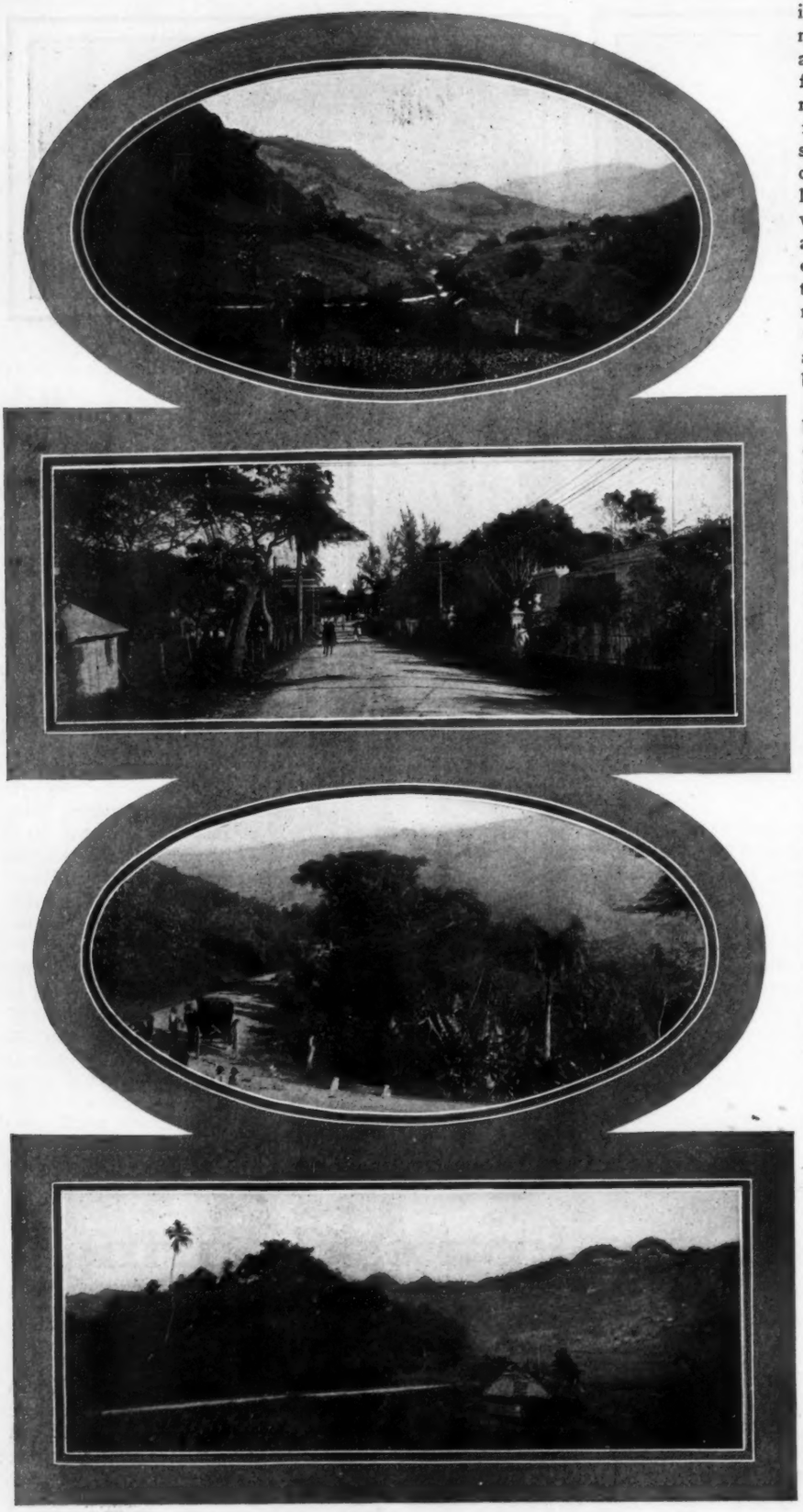
Good Roads and Routes-Touring

Porto Rico Affords Interesting Field for Trip

Little-known island has some splendid roads which are maintained in perfect condition by the Federal Government and cost much over $20,000 a mile to build. While the island has a tropical climate and is at its best in February, it is delightful all the year around. The Touring Club of America is compiling data for those who may contemplate this interesting trip.

DESPITE the fact that the island of Porto Rico has been under the American flag for nearly a dozen years, the island is still about as unfamiliar to the average American citizen as Mindanao in the Philippines or the domain of the Emperor Kookoo on the south side of Papua. And yet Porto Rico is almost as close to New York as Havana and is many times more attractive in every possible way than Cuba. Thousands and thousands of wealthy Americans visit Cuba each winter, bowing to the extortion that is to be met with on every hand in order to enjoy the balmy softness of the tropical weather. Those who have had actual experience unite in saying that the hotel accommodations in all Spanish-American sections are not adequate from the American viewpoint.

This applies with even more force to Havana than it does to the Porto Rican cities for the reason that there are more of them. The table of the hotels that cater especially to Americans



A—Comerio road near Coneno, Porto Rico

B—Military road to Ponce, near Santurce

C—Military road to Ponce leading to Caguey

D—Comerio road on the way to Manati

is equally execrable. If one is wise in making a tour of Porto Rico, he will avoid the places that make a specialty of foreign trade and seek the ones where native conditions obtain. As a matter of fact, eating and drinking must be considered minor matters in any tropical climate at any time of the year, particularly for visitors. Experienced travelers will all declare that the less one eats and drinks in Porto Rico or anywhere else within the tropics, the less his system will have to struggle with. A full meal accompanied by alcoholic drinks will produce apoplexy about as readily as an advanced spark will produce a back-kick.

But if one wants to enjoy an automobile tour under unique and interesting conditions and is prepared to forego the pleasures of the table during that period, a trip through Porto Rico should not be overlooked in thinking over plans. The climate, particularly in what would be the winter season in this latitude, is delightful. It is soft and mild and moist. The human system is not under heavy stress to keep up the vital fires of the body and does not require much fuel. Nature has been prodigal with Porto Rico and the verdure of the fields and forests is as intense as it is in Ireland, albeit the jungles and tropical verdancy are much thicker than they are in the Emerald Isle.

Porto Rico has hundreds of miles of beautiful roads. They are solidly built and the Government of the United States keeps them in better condition for travel than it does the military and government roads here at home. The Spanish built the roads and the Americans have improved and extended them. They are smooth, fairly straight and adequately broad. They connect the principal cities and traverse the island from end to end.

San Juan and Ponce, the chief ports, are situated close to sea level, but the road that goes between them was laid out for a considerable portion of its length along the sides of green hills. In the hill country, which occupies a large portion of the interior of the island, the nights are cool and fine and the climate is not unlike that of the temperate zone in summer. Fogs are to be encountered at some seasons, particularly in the highlands, but are not of enough moment to be reckoned as an obstacle to touring.

Porto Rico enjoys a finer climate than Cuba. It lies farther out in the ocean and is swept by cooling breezes. The island is the most easterly of the West Indies, lying east of Haiti, which is east of Cuba. It is in the form of a parallelogram, 108 miles in its greatest length by 43 miles across. It is about half as large as New Jersey, its area being about 3,600 square miles.

The soil is wonderfully fertile and agriculture and lumbering are the chief in-

dustries. Tropical fruits of all kinds grow in profusion in the lowlands and the products of the temperate zone are rankly prolific on the uplands. Various kinds of wood, valuable for cabinet-making as well as for rougher uses, are native in the hills.

Sugar and tobacco are the chief crops, with coffee and fruits next in importance. In a mineral sense the island is a curious mixture. It has been said that there are more different kinds of valuable minerals on the island than have been found in any place of similar size on earth. Gold, copper, iron and lignite have been found in workable quantities, and marble, building stone, salt and amber exist in large areas, but have not been specially developed so far.

The military road between Ponce and San Juan is a masterpiece of highway construction and maintenance. It is about 85 miles long and takes the general form of a giant elongated W. Ponce is at one of the uprights of the W, and the first stretch of the road, leading to the apex of the first angle, has an average grade of 8 per cent. In some places it is as much as 12 per cent. The rise is so steady that even this heavy grade does not seem so steep as it would under less delightful road conditions.

From the apex of the angle and included between the two prongs of the road, is the great tobacco district of the island, one of the richest and largest high-class tobacco districts in the world.

The leg of the route that joins the first at this point brings the tourist back into the hills skirting the tobacco district, and the next one follows the side hills to the top of the other prong.

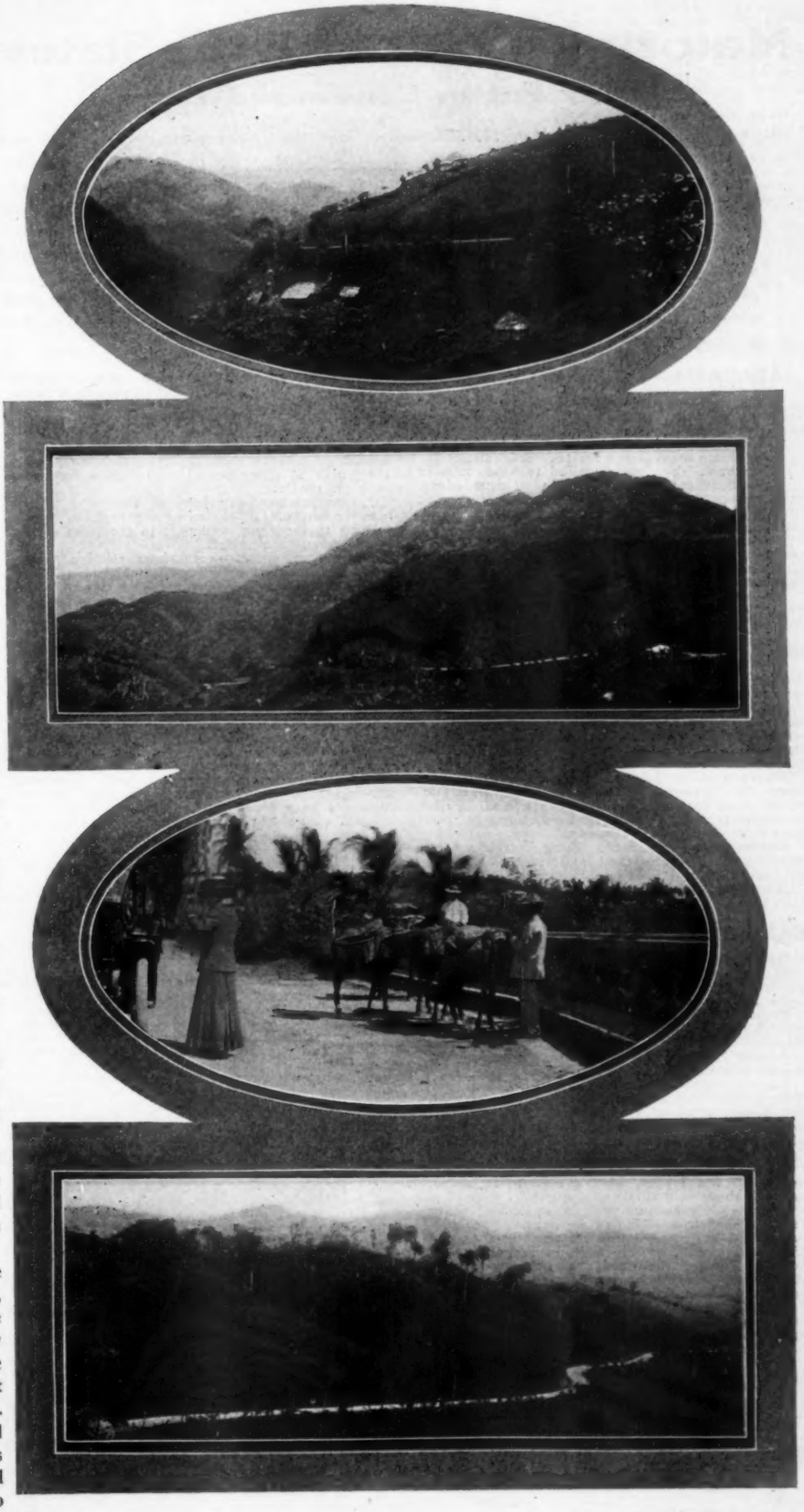
From there to San Juan the road descends rather more gently than it ascended, the average grade of the descent being about 5 per cent.

It cost the Spanish Government about $20,000 a mile to build the foundation for this highway and the United States has spent vast sums in bettering it in many ways.

With a good automobile, one that can climb a hill and go well on the flat, the tourist may leave Ponce at dawn and reach San Juan in time for what passes for breakfast in Porto Rico.

With a good car, the trip from Ponce to San Juan can be made in three hours, but it is vastly better to take one's time so that a fuller enjoyment of the beauty of the country may be had. Say that the trip requires four, or even five hours, it may be finished easily in one morning. Several trips over this road will be needed by the average tourist before he exhausts its possibilities. There are other good roads in the island, sufficient probably to keep a party busy for several weeks.

If one decides to go, let him remember that while the climate in February is the best, any time of the year is good for touring in Porto Rico.



E—Military road leading to Ponce over Arbonito

F—The Arecibo road, Porto Rico, near Adjuntan

G—Picturesque donkey packs seen along roads leading to Candado, near the American colony

H—Military road near Coguan

Motoring Laws of All the States

Plainly Put in Condensed Form

Simon T. Patterson, member of the Allegheny County Bar, Pennsylvania, presents a concise résumé of the laws governing the use of automobiles on the highways of all of the States in the Union and Canada, including the provinces, the idea being to afford to automobilists a clear and brief statement of the legal facts in such a way that the tourist, when out of the bounds of his own State, will know his rights, and understand his limitations. It is worth something that the author departed from the customary order of stating the various laws, and resorted to a plan which gives uniformity, making it easy to find the information desired, and it is pointed out that redundant legal phrasing of the law has been discarded without loss of technical accuracy.

ALABAMA—Law of October 9, 1903

REGISTRATION—The law requires that motor vehicles be registered with the Probate Judge of any county and makes no mention of exemption of non-resident owners. There is no fee required except a small fee for the certificate.

EQUIPMENT—You are required to have suitable and efficient appliances to lessen noxious odors, diminish noise and bring such vehicle to a quick stop. The act makes no mention of lamps, horns, bells, etc.

SPEED REGULATIONS—The act fixes 8 miles an hour as a speed limit in all cases generally throughout the State, and specifies certain instances of illegal speed as follows:

1. Must not pass persons driving horses, or foot passengers walking in the highway at a greater rate than 8 miles an hour.
2. Must not pass a public school or church during hours at a greater rate than 8 miles an hour.
3. Must not cross a dam or causeway where the traveled portion is less than 20 feet wide at a greater rate than 4 miles an hour.

STOP WHEN—At request of signal by putting up the hand, from a person in charge of a horse or other domestic animal, and remain stationary and upon request, stop motor, until such person has had time to pass.

PENALTY—First offence, not less than $20 nor more than $100 fine; subsequent offences, a fine of not less than $50 nor more than $200 or imprisonment in the county jail for not less than 30 days nor more than six months.

OBSERVATIONS—There is nothing in this act restricting the power of local authorities to regulate the speed and use of motor vehicles upon the highways of the various cities, towns or villages.

CALIFORNIA—Laws of March 22, 1905

DEFINITIONS—"Closely built up" means (a) built up with structures devoted to business and (b) where the buildings average less than 100 feet apart for one-quarter mile.

REGISTRATION—Non-residents need not register provided they have complied with the laws of the State of their residence requiring the registration of motor vehicles, and conspicuously display the license tags or markers of that State.

EQUIPMENT—The law requires good and efficient brakes, suitable bell, horn or other signal, and during a period from one hour after sunset to one hour before sunrise two lamps showing white lights in direction vehicle is going. One red light in rear.

SPEED REGULATIONS—1. Never faster than is reasonable and proper, having regard for traffic, use of highway and safety of the public.

2. In closely built-up sections as defined above never faster than 10 miles an hour. The local authorities, however, must erect signs at each end of street in such closely built-up section, easily readable, bearing the words "SLOW DOWN TO — MILES," and also an arrow pointing in the direction where the speed is to be reduced.

3. Elsewhere in any incorporated city and county, city or town, never faster than 15 miles an hour.

4. Elsewhere outside of any incorporated city and county, city or town, never faster than 20 miles an hour.

5. When approaching and traversing a bridge, dam, sharp curve or steep descent car must be under control and not exceeding 4 miles an hour.

6. Approach crossings and intersections at a reasonable rate, having regard for traffic, use of highway, etc.

WARNINGS—Upon approaching persons walking in the roadway and horses give reasonable warning.

STOP WHEN—1. At request or by signal by putting up hand from person in charge of restive horse and remain stationary a reasonable time until such person has passed.

2. Cause motor to cease running if horse appears badly frightened.

3. In case of accident, stop, and upon request of person injured, or any person present, give such person name and address of owner of vehicle.

RULES OF THE ROAD—1. Reasonably turn to the right of the center so as to pass without interference.

2. When overtaking vehicle pass to the left, "and the rider or driver of such horse, draft animal or other vehicle shall, as soon as practicable, turn to the right so as to allow free passage on the left."

3. At intersections, keep to the right of the intersections of the center of the highways when turning to the right, and pass to the right of the center when turning left.

LOCAL ORDINANCES—Local laws relative to the use of the highways by motor vehicles, effecting registration, or prescribing a slower rate of speed are of no validity. But the local authority may limit the speed in incorporated cities and towns to not less than 10 miles an hour upon placing signs at boundary of streets and municipality line reading "SLOW DOWN TO — MILES," and an arrow pointing in the direction where the speed is to be reduced. Public parks may make their own regulations, however, and motor vehicles may be excluded from cemeteries.

TRIAL—You are entitled to an immediate hearing and if that cannot be had must be released upon giving bail or posting a forfeit for your appearance in a sum equal in amount to the maximum fine for the offense charged. However, you may leave motor vehicle in lieu thereof. Always take a receipt in writing if money must be paid to an officer.

CONNECTICUT—August 10, 1909, as Amended August 26, 1909

DEFINITIONS—Non-residents shall apply to residents of States and countries who have no regular place of abode or business within this State for a period of more than three months in the calendar year.

REGISTRATION—Non-residents may use the highways not exceeding ten days in any one year without registering machine or licensing operator. Must display license tags or markers of the State of their residence substantially as follows: One in front and one on the rear, must at all times be plainly legible, and rear number must be horizontal, must not swing, must be at least 18 inches from the ground, and at night must be illuminated so as to be visible at least 50 feet. If found guilty of violating any of the provisions of Sections 11, 12, 18 and 19, you may be required to register.

EQUIPMENT—Machines of over 10 horsepower must have at least two brakes. Suitable bell or horn. During the period from one-half hour after sunset to one-half hour before sunrise must carry two white lights visible at least 200 feet in direction machine is going and show a red light in rear.

MUFFLER. Within limits of any city or borough at all times and elsewhere between 9 p. m. and 6 a. m. engine must be muffled. Must not use any other device for signal save horn, air or gas blown whistle or bell.

SPEED REGULATIONS—Section 11. Never greater than is reasonable and proper, having regard for width, traffic, use of highway and safety of the public. Never recklessly.

Section 12.

1. Upon approaching and passing pedestrians and draft animals reduce speed when reasonable care requires.

2. Stop on signal when horse appears frightened and remain so until person in charge has had a reasonable time to pass.

3. Slow down on approaching curves and intersections and give timely signal.

4. Keep to right of center of intersections turning right and pass to the right of the center turning left.

5. If speed exceeds 25 miles an hour for one-eighth mile it is prima facie evidence of unreasonable and improper speed.

6. Exceeding 10 miles an hour, except within incorporated cities, when operator's view is obstructed, when approaching intersections, traversing a bridge, sharp turn, steep descent or curve, is prima facie evidence of an unreasonable and improper speed.

7. Exceeding 3 miles an hour passing street car, stopped or about to stop, on same side on which passengers are ordinarily received or discharged is prima facie evidence of an unreasonable speed.

STOP WHEN—See subdivision 2 under Speed Regulations.

See subdivision 5 under Unlawful Acts.

WARNINGS—See subdivision 3 under Speed Regulations.

RULES OF THE ROAD—See subdivision 4 under Speed Regulations.

LOCAL ORDINANCES—Local authorities cannot regulate the speed of motor vehicles upon the public highways except possibly in public parks, and in event of shows, processions, assemblages or parades in the public streets.

UNLAWFUL ACTS—Under Section 18 of the act the following acts are unlawful:

1. Operating a motor vehicle while intoxicated.
2. Upon a bet or wager, or in a race.
3. For the purpose of making a speed record.
4. Failing to stop car in case of accident.

Under Section 19:

5. Refusing to give, and for giving false information to an officer, failing to stop when signaled by an officer, refusing to sign name in the presence of an officer, and refusing to show license.

PENALTY—For violating Speed Regulations, not over $500 or not more than one year.

For violating Section 18, not more than $500 nor more than one year or both.

For violating Section 19, not more than $100.

DELAWARE—Chapter 120, Laws 1909

REGISTRATION—Residents of another State are entitled to the same exemptions from the provisions of this act as are granted to the residents of Delaware by that other State. A citizen of Pennsylvania, therefore, who has complied with the laws requiring the registration of motor vehicles is entitled to the use of highways of Delaware for ten days in a year without registration. The number plates or markers must be carried substantially as follows: Parallel to the axles, kept free from dirt, etc., during the period from one hour after sunset to one hour before sunrise the rear tag must be illuminated when vehicle is in use. You are not subject to arrest, however, when one tag is missing.

EQUIPMENT—1. Good and efficient brakes.

2. Horn or bell, to be sounded when necessary to insure safety.

3. During the period of from one hour after sunset to one hour before sunrise must show at least one white light visible not less than 200 feet in direction vehicle is going and one red light visible in the opposite direction.

SPEED REGULATIONS—The following rate may be maintained but not exceeded:

1. Never greater than is reasonable, having regard for traffic, use of the highway and safety of the public, etc.

2. One mile in five minutes where houses are on an average less than 100 feet apart, slowing to six miles an hour at curves and intersections.

3. One mile in three minutes where houses are on an average more than 100 feet apart, slowing to 12 miles an hour at all curves, intersecting roads, descending hills and in passing other vehicles.

STOP WHEN—1. Upon meeting horse, should it appear unmanageable.

2. In case of injury, and upon request of the person injured, give name and address of owner.

3. Motor or engine shall be stopped at request or on signal.

4. Upon request of constable or police officer. Exhibit registration certificate, and furnish to any legally constituted authority all information in your possession as to the identity of the operator of any motor vehicle.

WARNINGS—1. Give reasonable warnings at all times.

2. See Equipment, subdivision 2.

RULES OF THE ROAD—1. Keep to the right when approaching other vehicles and pass to the right.

2. Pass to the left on overtaking other vehicles. Driver of vehicle in front must turn to the right of the center of the road to allow free passage to the left.

UNLAWFUL ACTS—Operating a motor vehicle while intoxicated. Penalty is a fine of not more than $100 or not over 30 days imprisonment, or both.

TRIAL—The magistrate is required to accept in lieu of bail money or other valuable equal in amount to the maximum penalty for the offense which the accused is charged with, or may retain the motor vehicle in lieu thereof.

PENALTY—The penalty for the first offense are fines of not less than $10 nor more than $25, and in case of non-payment, not more than 10 days imprisonment.

FLORIDA—Approved May 11, 1905

REGISTRATION—Non-residents are exempt for a period of 30 days upon exhibiting license from their own State.

EQUIPMENT—Must have a suitable bell, horn or

whistle. Must carry two lighted lamps from sunset to sunrise. No mention where they are to be placed. No mention of red light for the rear. Must display license tag on the back of the motor vehicle. Penalty for violation same as a misdemeanor.

SPEED REGULATIONS—1. Never faster than is proper and reasonable, having regard for the traffic, use of the highway, etc.

2. Must not exceed four miles an hour approaching sharp curves, bridges, fills and intersections, of or crossings of other roads.

3. At all times must be under perfect control.

STOP WHEN—1. Upon request, or by signal by putting up the hand from person in charge of restive horse, and remain stationary long enough for horse to pass. Stop motor if horse appears badly frightened, on request.

2. In case of accident, stop, and upon request of any person present give name and address of owner.

WARNINGS—Upon approaching pedestrians and draft animals give ample warning.

TRIAL—You are entitled to an immediate hearing, or must be released upon posting sum equal to the maximum fine for the offense charged as a forfeit, or may leave motor vehicle in lieu thereof.

PENALTY—A fine of not more than $100 for the first offense.

GEORGIA—No. 478, Laws of 1910

REGISTRATION—Non-residents are not required to register provided they have complied with the registration laws of their own State, and display registration tags or markers of that State. This exemption, however, is good for but thirty days.

EQUIPMENT—During a period from one hour after sunset to one hour before sunrise show at least one white light, throwing a light at least 100 feet in the direction vehicle is going. Show a red light in the opposite direction which also illuminates the rear number plate or marker.

SPEED REGULATIONS—Never greater than is reasonable and proper, having regard for traffic, use of the highway, etc. Approaching bridge, dam, high embankment, sharp curve, descent or crossing of intersecting highways and railroad crossings, machine must be under control and not exceeding 6 miles an hour.

STOP WHEN—At request or by signal by putting up hand or other sign of distress, stop as long as reasonable to permit restive horse to pass. Use reasonable precaution in overtaking and passing same. Stop engine on request.

WARNINGS—Upon approaching pedestrians or draft animals in the highway give reasonable warning. Avoid frightening horses.

RULES OF THE ROAD—1. Owner of machine has equal rights to the highway.

2. No person shall give a signal of distress or danger without reasonable cause.

LOCAL ORDINANCES—Municipalities may regulate running and operation of motor vehicles provided such regulations do not interfere with the provisions of this act.

UNLAWFUL ACTS—1. Operating a motor vehicle while intoxicated.

2. Person under sixteen forbidden to operate a motor vehicle unless has had one year's previous experience.

PENALTY—Section 1039, Vol. 3, Code of 1895, provides:

"Except where otherwise provided, every crime declared to be a misdemeanor is punishable by a fine not to exceed $1,000, imprisonment not to exceed six months, to work in the chain gang upon the public roads, or on such other public works as the county or State authorities may employ the chain gang, not to exceed twelve months, any one or more of these punishments in the discretion of the judge."

ILLINOIS—Act of 1907 as Amended 1909

REGISTRATION—Non-residents are not required to register provided they have complied with the registration laws of their own State and display the license tags of such State on the front and rear of the machine. Rear number plate must be fastened so as not to swing.

EQUIPMENT—1. Good and sufficient brakes.

2. Suitable bell, horn or other signal device.

3. During the period from sunset to one hour before sunrise show at least two lights visible at least 200 feet in the direction vehicle is going and at least one red light in the opposite direction which must also illuminate the rear number plate.

SPEED REGULATIONS—1. Never greater than is reasonable and proper, having regard for traffic, use of the highway and safety of the public.

2. Exceeding 10 miles an hour for one-eighth mile in closely built-up business portions of any incorporated city, town or village; or

3. Exceeding 15 miles an hour in residence portions of any such city, town or village for a like distance; or

4. Exceeding 20 miles an hour for a distance of one-fourth mile outside of any such city, town or village shall be prima facie evidence of unreasonable and improper speed.

5. Exceeding 6 miles an hour going round a corner or curve where operator's view is obstructed is prima facie evidence of an unreasonable and improper speed.

STOP WHEN—1. Stop without signal where horses appear frightened until they have had an opportunity to pass.

2. Stop in case of accident and upon request of person injured or any person present, give name and address of owner.

WARNINGS—1. Give reasonable warning.

RULES OF THE ROAD—Seasonably turn to the right of the beaten track. This applies to any vehicle on the highway and the penalty for violating this provision is $5.

LOCAL ORDINANCES—1. Local authorities having jurisdiction over public parks and boulevards connecting or pertaining to same can enforce reasonable local speed regulations, provided same are not lower than the rate fixed for other vehicles, and provided conspicuous signs are placed indicating the rate.

2. Local authorities may exclude automobiles from cemeteries. Otherwise cannot restrict the speed limits as provided above.

UNLAWFUL ACTS—1. Racing prohibited. Penalty, fine not exceeding $200.

2. Must stop engine or motor when machine is left unattended on the public highways.

PENALTY—1. For violating subdivision 3 under Equipment, a fine not to exceed $25.

2. For violating Speed Regulations, a fine not to exceed $200.

3. For violating sub-division 1 of Stop When, fine not to exceed $200.

INDIANA—Act of March 12, 1907, as Amended by Act of March 6, 1909

REGISTRATION—Non-residents are not required to register provided they have complied with the registration laws of their own State, and display the license tags or markers of such State both on the front and on the rear of the motor vehicle.

EQUIPMENT—1. After dark must carry lighted lamps.

2. Good and efficient brakes.

3. Suitable bell, horn or other signal.

SPEED REGULATIONS—1. Never greater than is reasonable and proper, having regard for traffic, use of the highway and the safety of the public.

2. Never exceed 8 miles an hour in business or built-up portions of any municipality.

3. Never exceed 15 miles an hour in other portions of any municipality.

4. Never exceed 20 miles an hour outside of municipalities.

5. Approaching bridge, dam, sharp curve or steep descent, and in traversing same, and in approaching crossings and intersections of highways, vehicle must be under control.

6. Must not pass a farm or draft animal at a speed exceeding 6 miles an hour.

STOP WHEN—Upon request or by signal by putting up hand from person in charge of horse (if there is sufficient light for such signal to be perceptible) stop, and remain so until such person has had a reasonable opportunity to pass.

WARNINGS—Upon approaching draft or farm animals upon public highways signal and give persons in charge a reasonable time to prepare for passing of motor vehicle.

RULES OF THE ROAD—1. Furnish aid upon request.

2. On overtaking, before passing, allow person in front a sufficient time to get to the side of the road. This he must do "with reasonable promptitude" and allow the motor vehicle one-half the traveled portion of the highway.

LOCAL ORDINANCES—Local authorities have no power to diminish or prohibit any rate of speed permitted by this act, with the possible exception of sub-division 6 under Speed Regulations.

UNLAWFUL ACTS—An intoxicated person is forbidden to operate a motor vehicle. Penalty, a fine of not over $100 or not over six months' imprisonment, or both.

PENALTY—Not more than $50 for the first offense.

IOWA—Thirtieth General Acts as Amended

DEFINITIONS—Closely built-up portions means those devoted to business or where for not less than one-fourth mile the dwelling houses on such highway average not more than 100 feet apart.

REGISTRATION—Non-residents are not required to register provided they have complied with the registration laws of their own State and display the license tags of such State upon the rear of the vehicle.

EQUIPMENT—1. Good and efficient brakes.

2. Suitable bell, horn or other signal.

3. During a period of from one hour after sunset to one hour before sunrise display at least one light visible a reasonable distance in which the vehicle is going and a red light visible in the opposite direction.

SPEED REGULATIONS—1. Never greater than is reasonable and proper, having regard to traffic, use of the highway and the safety of the public.

2. Must not exceed 10 miles an hour in closely built-up portions of cities, towns and villages.

3. Must not exceed 15 miles an hour elsewhere in cities, towns and villages.

4. Must not exceed 20 miles an hour outside of cities, towns and villages.

5. Approaching crossings of intersecting highways, bridge, sharp curve or steep descent, or in traversing same, speed must be less than above specified, must be reasonable, and car must be under control.

STOP WHEN—Upon request or by signal by putting up hand from person in charge of restive horse, or other draft or domestic animal, stop, and remain so as long as is reasonable to permit such person to pass. Render necessary assistance to party in charge of horse in so passing.

RULES OF THE ROAD—See above under Stop When.

LOCAL ORDINANCES—Local authorities cannot exclude motor vehicles from the highways or require local registration.

PENALTY—For violating any of the provisions of the act, fine of not over $25 for the first offense.

KANSAS—Laws 1903, Chapter 67

REGISTRATION—No registration required.

EQUIPMENT—1. Suitable bell, horn or other signal.

2. Good and efficient brakes.

3. During a period of from one hour after sunset to one hour before sunrise display at least one lighted lamp visible a reasonable distance in the direction in which the motor vehicle is going. No mention of a red light for the rear.

SPEED REGULATIONS—1. Never greater than is reasonable and proper, having regard for traffic, use of the highway and the safety of the public.

2. Must not exceed 20 miles an hour outside of thickly settled or business parts of any city or town.

3. Must not exceed 10 miles an hour within same.

4. Upon approaching and traversing crossings and intersections run at a less speed than above specified.

5. Reduce speed upon approaching horses if same appear restive and frightened.

STOP WHEN—If requested by signal or otherwise. This provision applies to automobiles going either in the same or in the opposite direction.

RULES OF THE ROAD—Exercise every precaution to prevent frightening horses.

LOCAL ORDINANCES—Cities of the first, second and third class may by local ordinance regulate and control use and speed of automobiles within their limits and prescribe penalties for the violation thereof, but such ordinances must not be inconsistent or repugnant to the general law.

PENALTY—Fine not exceeding $100 for violating any of the provisions above mentioned.

KENTUCKY—1910, Chapter 81

REGISTRATION—Non-residents are not required to register provided they have complied with the registration laws of their own State, and display license tags of such State on the front and rear of machine, and comply with the regulations of this act regarding lights.

EQUIPMENT—1. During the period from sunset to one hour before sunrise display at least two lighted lamps showing white lights visible at least 200 feet in the direction vehicle is going and one red light visible in the opposite direction.

2. Good and sufficient brakes.

3. Suitable bell, horn or other signal device.

SPEED REGULATIONS—1. Never greater than is reasonable and proper, having regard for traffic, use of the highway and safety of the public.

2. Exceeding 10 miles per hour in closely built-up or business portions of any incorporated city, town or village for a distance of one-eighth of a mile; or

3. Exceeding 15 miles per hour in residence portion of any incorporated city, town or village for a distance of one-eighth of a mile; or

4. Exceeding 20 miles per hour outside of same for a distance of one-fourth of a mile shall be prima facie evidence of an unreasonable and improper rate of speed.

5. Exceeding 8 miles per hour going round a curve or corner, crossing a highway, or where operator's view of the road traffic is obstructed is also prima facie evidence of such improper speed.

STOP WHEN—Without signal when approaching a horse on the highway and it appears frightened.

LOCAL ORDINANCES—Forbidden except in the following cases:

1. Upon speedways maintained by local autnorities.

2. Upon parks and connecting boulevards. However, rate of speed so fixed for motor vehicles must not be lower than that fixed for other vehicles, and before such regulations are effective signs must be conspicuously placed indicating the rate permitted.

UNLAWFUL ACTS—Must stop motor or engine when vehicle is left unattended upon the public streets.

PENALTY—Not less than $20 nor more than $50 fine.

MAINE—Chapter 24 Revised Statutes as Amended 1905

DEFINITIONS—Team means "all kinds of conveyances for persons and property."

REGISTRATION—Non-residents may use the highways of Maine without registration, provided:

1. Machine must be driven by some person licensed in Maine or some other State.
2. Unless prohibited by special law duly authorized by the Legislature.
3. Must display, front and rear, license tags of home State.
4. Unlicensed persons may operate machine if accompanied by a licensed operator.

EQUIPMENT—1. Suitable bell or other appliance. Must be able to be heard a distance of 300 feet.

2. During a period from one hour after sunset to one hour before sunrise must carry lighted lamps.

SPEED REGULATIONS—1. Upon highway, townway, public street, avenue, driveway, park or parkway limit 15 miles per hour.

2. Upon same within compact or built-up portions of city, town or village, 8 miles per hour, except where such city or town may by ordinance or by-law permit a greater rate of speed.

3. Never greater than is reasonable and proper, having regard for traffic, use of the highway and safety of the public.

4. Signs at right of road marked "Automobiles Go Slow" mean reduce speed to four miles an hour. Stop when meeting horse within such limits. Do not proceed until horse has passed unless signaled to do so by driver.

STOP WHEN—1. Upon request of driver of horse, or upon signal from driver, and remain stationary a reasonable time to allow same to pass.

2. See sub-division 4 under Speed Regulations.

3. When it is unsafe to do so, *i. e.*, to pass a person about to be met or overtaken, if requested, shall stop a reasonable time, at a convenient place, to enable the other to pass.

4. When team overtakes team going in same direction, team ahead, if requested, shall drive to right or left, or stop a reasonable time at a convenient place, to allow the other to pass.

RULES OF THE ROAD—1. Persons traveling with a "team" (and this, of course, includes wheelbarrows and baby carriages) shall seasonably turn to the right of the traveled part of the road.

2. See subdivisions 3 and 4 under Stop When.

3. Obstructing highway with team or leaving it unattended forbidden. Penalty for violating the above is not less than one nor more than twenty dollars fine to be recovered on complaint made within 60 days.

LOCAL ORDINANCES—Laws of 1909, Ch. 133, prohibit the use of automobiles in the towns of Eden, Mount Desert, Tremont and Southwest Harbor on the island of Mount Desert in Hancock County.

Laws of 1907, Ch. 53. The town of Camden, Knox County, and the town of Lincolnville, Waldo County, may adopt by-laws prohibiting the use of automobiles on the following named section of roads within their respective limits upon the margin of Lake Megunticook. The road known as turnpike, beginning at Hopkin's corner, so-called, in Camden to Young Town, so-called, in Lincolnville. All entrances to said road must be marked No Automobiles Allowed on this Road.

Chapter 56. Bluehill, Hancock County, may prohibit the use of automobiles on the following roads: From the Granite Bridge near Wescott's Corner, so-called, easterly and southerly to Friend's Corner, thence northeasterly to East Bluehill Bridge, thence northerly to Inman's private way on Morgan's Bay road, so-called; also the road leading from Babson's Corner, so-called, northerly to Durgan's Corner, so-called; also the road leading from the Brooklin line northerly and westerly to Fall's Bridge; also the road leading from Herrick's Corner, so-called, northeasterly to Parker Point, so-called, thence northwesterly to Main street in Bluehill village; also the road leading from the corner near the Ball Place, so-called, southwesterly and westerly to the corner near the Bluehill Inn. Roads so closed must be marked as shown above.

Chapter 340. Readfield, Kennebec County, may prohibit the use of automobiles upon the following road. The Pond road, so-called, being the road beginning at the road leading from Readfield to Kent's Hill near the saw-mill and running thence northwesterly to the road leading from Mount Vernon to Kent's Hill. Road so closed must be marked as above.

UNLAWFUL ACTS—1. See Registration, sub-division 1.

2. Obstructing highway with team or leaving it unattended.

3. Racing is prohibited.

PENALTY—For violating Speed Regulations, not over $50, or over ten days' imprisonment. Same penalty for not stopping upon request.

MARYLAND—Article LVI, Chapter 207, Laws of 1910

REGISTRATION—If non-resident has complied with the laws of his own State relative to motor vehicles, he may travel in Maryland not exceeding two periods of seven consecutive days each in a calendar year without registration. The number tags or markers of his own State must be carried substantially as follows: Must be kept reasonably clean, rear one must not swing, more than one marker in front or rear prohibited. No penalty can be imposed where it clearly appears that registration number has been lost by accident. There must be obtained from the Commissioner of Motor Vehicles, and displayed on rear of car, a tag or marker issued by said commissioner. However, upon conviction of violating any of the provisions of Sections 140b, 140c, 140d, 140e and 140i you must register and obtain a Maryland license. The sections will be noted under the various titles following. Non-resident chauffeurs are entitled to the same exemption.

EQUIPMENT—1. Adequate brakes.

2. Suitable bell or horn or other device for signaling.

3. During the period from one hour after sunset to one hour before sunrise display two or more white lights on the forward part of the machine visible at least 200 feet. Display also a lamp showing red from the rear and white at the side. The act does not state that the rear number plate is to be illuminated. In case of a bona fide failure of the lights to operate, if operator sounds horn at least once in every 200 feet, keeps under 10 miles an hour, and takes the first reasonable opportunity of putting his lights in order, he will not be deemed guilty of violating this section.

SPEED REGULATIONS—Section 140b:

1. Never recklessly nor faster than is reasonable and proper, having regard to width, traffic and the safety of the public.

2. Exceeding 12 miles per hour in thickly settled or business parts of cities, towns or villages; or

3. Exceeding 18 miles an hour in parts of cities, towns or villages, outlying and not thickly settled; or

4. Exceeding 25 miles an hour in the open country shall be prima facia evidence of an improper speed.

Section 140c:

Slow to a reasonable and proper rate and machine must be under control when:

5. Approaching pedestrian upon the highway.
6. Horse, led, ridden or driven.
7. On sharp curve, turn or descent.
8. Passing street car receiving or discharging passengers.
9. Traversing bridges, crossings, curves and descents.

STOP WHEN—Section 140c (continued):

1. If horse appears frightened.

2. If person in charge thereof signals so to do by raising hand vertically. No person shall give the signal to stop unless necessary.

Section 140d:

3. In case of accident, operator must immediately stop, give name, residence, number of license to operate, upon demand. Must also render such assistance as may be reasonable and necessary within his power.

WARNINGS—1. Within limits of cities, towns or villages, only horns blown by means of hand pressure upon a rubber bulb shall be used, or small electric bells of moderate sound.

2. Signal device must not be sounded while passing a horse or other animal in the open country.

RULES OF THE ROAD—1. On meeting vehicles turn to the right of the center of the highway.

2. On overtaking vehicles pass to the left. "Said vehicle so overtaken shall promptly, upon signal, turn to the right in order to allow free passage to the left."

3. At intersections of public highways, keep to the right of the center when turning right, pass to the right of the center when turning left.

LOCAL ORDINANCES—Towns or villages may pass a law or ordinance regulating speed that differs from the speed limits of this act, provided

Notice of same is posted in a plain and legible manner and in letters not less than 4 inches high on the right side of the roads entering said town or village at the boundary line and stating the local speed limit, and unless the notice is posted and maintained as aforesaid, such local law will be of no validity as affecting the speed prescribed by this act. Such special laws affect towns and villages only. No special law can be enforced affecting the "open country."

UNLAWFUL ACTS—Section 140e. Subdivisions, (1), (2) and (4) following:

1. Intoxicated persons forbidden to operate a motor.
2. Persons under 16.
3. Persons under the influence of drugs or liquors.
4. Operating a motor vehicle in a race or on a bet or wager.
5. See Warnings, sub-divisions (1) and (2).
6. Must lock or secure device by which car is started, when same is left standing unattended in the street.
7. Must also stop motor, and cut off electric current.

TRIAL—You are entitled to an immediate hearing. If such cannot be had you must be released upon giving bond or posting a forfeit equal to the maximum fine prescribed for the alleged offense. Motor vehicle may be tendered as security. An appeal must be taken within 30 days from date of judgment.

PENALTY—For violating any of the provisions of Sections 140d, 140e or 140i, not more than $500 fine or not more than 90 days' imprisonment or both.

For violating any other provision of the act, not more than $50 fine.

OBSERVATIONS—Section 140i:

1. No chauffeur shall operate a machine in the absence of the owner without his consent.
2. No chauffeur or other person having the care of a motor vehicle for the owner shall receive or take any bonus, discount or other consideration on supplies or parts furnished or purchased for such motor vehicle or on any work or labor done thereon by others.

MASSACHUSETTS—Acts 1909, Chapter 534

DEFINITIONS—Intersecting Way means any way which joins another at an angle, whether or not is crosses another.

Non-resident shall apply to residents of States or countries who have no regular place of abode or business in this commonwealth for a period of more than three months in a calendar year.

Thickly settled or business parts of a city or town shall mean the territory of a city or town contiguous to any way which is built up with structures devoted to business, or the territory of a city or town contiguous to any way where the dwelling houses are situated at such distance as will average less than 200 feet between them for a distance of a quarter of a mile or over.

Way means any public highway, private way laid out under authority of statute, street, alley, road, avenue, park or parkway.

REGISTRATION—The conditions under which motor vehicles owned by non-residents may be operated are as follows:

1. Non-resident must have complied with the provisions of the law relative to motor vehicles of his own State.

2. The operator, either owner or chauffeur, may operate a motor vehicle upon the ways of Massachusetts without taking out a license so to do for a period of not exceeding ten days.

3. If non-resident or his chauffeur be convicted of violating any of the laws of Massachusetts relative to motor vehicles a license must then be secured.

4. The number tags or markers of said non-resident's own State, and none other, must be displayed substantially as follows: One in front and one in the rear. They must be plainly legible at all times. The bottom of the number plates must be horizontal and not less than 8 nor more than 36 inches from the ground. During the period when the vehicle is required to display lights the rear register number shall be illuminated so as to be plainly visible at a distance of 60 feet.

5. Ten days is the period in which machines owned by non-residents may be operated without a Massachusetts license being required. However, during the months of July, August and September a special license may be obtained to operate during these months, upon proper application upon blanks furnished by the Massachusetts Highway Commission. The fee for this special registration is as follows:

Automobiles of less than 20 H. P.....	$2.50
Automobiles of 20 H. P. to 30 H. P...	$5.00
Automobiles of 30 H. P. to 40 H. P...	$7.50
Automobiles of 40 H. P. to 50 H. P..	$10.00
Automobiles of 50 H. P. and up.....	$12.50

The commission will furnish without charge number plates for such purpose.

EQUIPMENT—1. Two brakes, one a foot brake, required on motor vehicles of over 10 horsepower. One brake on 10 horsepower or less.

2. Every motor vehicle must have a muffler or contrivance to prevent unnecessary noise.

3. Suitable bell, horn or signal device.

4. A lock or ratchet brake which can be set, a key or other contrivance to prevent such vehicle from being set in motion by unauthorized persons.

5. Lights from one-half hour after sunset to one-half hour before sunrise. Two white lights on front visible not less than 200 feet. At least one red light on rear with a white light so arranged as illuminate and not obscure the rear register number.

6. Nothing permitted on or about person of operator to impede the operation of the machine.

SPEED REGULATIONS—1. Never faster than is reasonable and proper, having regard for traffic and the safety of the public.

2. Must not exceed 20 miles an hour for a distance of a quarter of a mile outside of thickly settled or business parts of a city or town.

3. Must not exceed 15 miles an hour for one-eighth of a mile inside of thickly settled or business parts of city or town.

4. Must not exceed 8 miles an hour approaching intersecting ways, traversing crossings, intersecting ways, or going round corner or curve where the view is obstructed.

5. See Stop When, subdivision (2).
6. See Warnings, subdivision (1).
7. See Rules of the Road, sub-division (1).

STOP WHEN—1. Stop both car and motor when approaching a horse if horse appears frightened and if person in charge thereof shall signal to do so. Keep stationary long enough to permit horse to pass.

2. In passing street car which has stopped to take on or let off passengers, slow down, and stop when necessary for their safety.
3. Stop when signaled to stop by any police officer who is in uniform or who displays his badge conspicuously on outside of his outercoat or garment.

WARNINGS—Upon approaching a pedestrian in the street, upon approaching an intersecting way, or curve or corner where the operator's view is obstructed, slow down and give signal of approach.

RULES OF THE ROAD—1. Slow down on approaching crossings of ways, keep to the right of the intersection of the centers of both ways when turning to the right. Go to the right of the center before turning left.

LOCAL ORDINANCES—Cities and towns and park commissioners may make special regulations as to the speed of motor vehicles and may exclude such vehicles from certain ways. Notice of such special regulations must be conspicuously posted and have been approved by the Massachusetts Highway Commission. However, a motor vehicle cannot be excluded from a highway leading from one city or town to another. These special regulations must have been passed and approved since June 19, 1909, with the exception of those regulations upon the island of Nantucket.

The commission has power to make rules and regulations regarding motor vehicles, but no power to regulate the speed at which such vehicles may be operated on the public highways.

UNLAWFUL ACTS—1. Carrying a false number plate with intent to conceal identity. Penalty, not more than $100 or more than 10 days, or both.
2. Operating while intoxicated; or
3. On a bet, wager, or in a race; or
4. For the purpose of making a record and exceeding the speed limit; or
5. After causing injury, leaving without disclosing identity. Penalty, not over $200, not over six months, or both.
6. Refusing when requested by police officer to give name and address, or name and address of owner, or giving a false name; or
7. See Stop When, sub-division (3).
8. Refusing on demand of such officer to produce license or certificate to operate, or let him examine it; or
9. Refusing to sign your name in the presence of such officer. Penalty, not less than $25 nor more than $100.
10. Vehicle must not be left standing unattended in any public street or way without first locking or making it fast or setting the brakes thereon, and stopping the motor of said vehicle.

TRIAL—A complaint against a person for breaking the speed limit or violating the special rules of the commission may be placed on file at the discretion of the court or trial justice if the violation appears to have been unintentional or if no person or property could have been endangered thereby. If offense charged is violating the speed regulations or special speed regulations must be released upon posting a forfeit of $100. May be detained in custody for 24 hours for other offenses.

PENALTIES—For violating any provision of the act, rule or regulation of the commission, or special speed regulation, not less than $10 nor more than $25 for the first offense.

OBSERVATIONS—A record of first time of entering and leaving public garages is required by law and person operating motor vehicle must enter such data in a book kept at the garage for that purpose.

No one under sixteen will be granted a license to operate.

MICHIGAN—1909, No. 318

REGISTRATION—Non-resident owners need not register in Michigan provided:
1. Owner must have complied with the laws of his own State relative to motor-vehicles.
2. Must conspicuously display his State license tags.
3. This privilege is only extended to residents of those States that extend similar privileges to residents of Michigan. Pennsylvania grants residents of Michigan a ten-day exemption and hence residents of Pennsylvania may operate in Michigan for this period without being required to register. Residents of States that have no law relative to the registration of motor vehicles may be required to register in Michigan if they desire to use the highways therein.
4. Non-resident chauffeurs must wear badge assigned them by their own State before they will be permitted to operate in Michigan. But such State must reciprocate as regards Michigan chauffeurs. There is nothing in the Pennsylvania act preventing a chauffeur of Michigan operating a motor vehicle in this State for a period of ten days.

EQUIPMENT—1. Adequate brakes sufficient to control the vehicle at all times.
2. Suitable and adequate bell, horn or other device for signaling.
3. During a period from one hour after sunset to one hour before sunrise display at least two lighted lamps visible at least 200 feet in the direction the vehicle is going and a red light visible in the opposite direction with a white ray shining on the rear number plate.
4. Chains, non-skidding contrivances, tires composed in whole or in part of metal, forbidden except when highways are wet and slippery or covered with ice and snow.

SPEED REGULATIONS—1. Never greater than is reasonable and proper, having regard for traffic, etc.
2. Never in any event exceed 25 miles per hour.
3. Within corporate limits of cities and villages, not over 10 miles per hour in the business portion and not over 15 miles per hour in all other portions.
4. Upon approaching and in traversing an intersecting highway, bridge, dam, sharp curve or steep descent car must be under control.
5. Upon approaching pedestrian in highway, or horse or draft animal, must not exceed 10 miles per hour and must give reasonable warning of approach.

STOP WHEN—1. Upon request or signal by putting up hand from driver in charge of horse.
2. If horse appears badly frightened, upon request, stop motor or engine.
3. In case of accident, stop, give reasonable assistance. Upon request of anyone give name and address of owner and register number.

WARNINGS—1. See Speed Regulations, subdivision (5).

RULES OF THE ROAD—1. Seasonably turn to the right of the center of the traveled portion of the highway. Person approaching must do likewise to permit motor vehicle to pass.
2. Turn to the right of the centers of intersecting highways in turning right and pass to the right of the center in turnig left.
3. Persons upon being overtaken by motor vehicles must turn to the right of the center of the traveled portion of the highway upon request and give motor vehicle an opportunity to pass. However, should occupants of vehicle about to be passed desire assistance, it is the duty of the male occupants of the motor vehicle to give the assistance asked.

LOCAL ORDINANCES—1. Local authorities may make regulations diminishing but not increasing these speed limits in parks and parkways, but must post signs conspicuously indicating the rate permitted.
2. Local authorities may exclude motor vehicles from cemeteries.
3. Further than this cannot pass any laws affecting tourists in the use of the highways.

UNLAWFUL ACTS—1. See Equipment, subdivision (4).

TRIAL—In case of arrest without warrant officer must have personal knowledge of the violation of the act.
1. You have a right to demand an immediate trial.
2. Failing that you must be released upon posting a forfeit equal in amount to the maximum fine for the particular offense charged, or may leave machine in lieu thereof.

PENALTY—For violating any provisions, upon conviction or pleading guilty, a fine of not exceeding $25 and costs for the first offense. If not paid not over ten days in jail.

MINNESOTA—Supplement Laws 1909, Section 1278

REGISTRATION—Non-resident need not register, provided:
1. Carries number tags of his own State for easy identificiation.
2. Tag must be displayed on the rear, and be securely fastened.

EQUIPMENT—1. Adequate brakes sufficient to control the vehicle at all times.
Suitable adequate bell, horn or other signal.
3. From one hour after sunset to one hour before sunrise at least two lighted lamps must be displayed on the front of the vehicle and one red on the rear. White rays of rear lamp must shine on number plate.
4. A muffler must be used and not "cut out or disconnected" within the limits of any city or village within the State.

SPEED REGULATIONS—1. Never greater than is reasonable and proper having regard to the width, condition and use of the highway.
2. Approaching and in traversing a dam, bridge, sharp curve or steep descent and upon approaching a crossing or intersecting highway or in passing from a side street into a main street where persons or vehicles are not plainly discernible, machine must be under perfect control and not exceeding one mile in eight minutes.
3. Speed must never exceed 25 miles per hour.

STOP WHEN—1. On request or by signal by putting up hand from person in charge of horse or other draft animal, stop. Use reasonable precaution in passing. Stop motor if horse appears badly frightened, upon request.

RULES OF THE ROAD—1. All persons meeting upon highway must slacken pace if necessary and seasonably turn to the right of the center of the traveled portion of the road.
2. Person overtaking another passes on the left. Person overtaken must turn to the right as soon as practicable so as to give half of the traveled road to the other.
3. At intersections keep to the right of the center when turning right, pass to the right of the center when turning left.
4. In cities or villages where traffic is large, slow moving vehicles must keep near the right curb allowing those moving the more rapidly to keep nearer the center. All vehicles, however, must keep to the right of the center of the street.

UNLAWFUL ACTS—1. Tampering with an automobile.
2. Unreasonably obstructing or impeding a motor vehicle upon the highway.
3. Taking and removing an automobile from a garage without the knowledge and consent of the owner.
4. See also Equipment, subdivision (4).

OBSERVATIONS—It should be noted that this act does not specifically prohibit local authorities passing and enforcing ordinances limiting a lower rate of speed, excluding motor vehicles from certain highways and other local restrictions.

MISSISSIPPI

There is no general law regulating the use of motor vehicles in this State. In the absence of such general law tourists are subject to local regulations. The following rules of the road are found in the Code of 1906, Section 4412:
1. Keep to the right.
2. Pass overtaken vehicles on the left. If vehicle in front fails to turn to the right to give overtaking vehicle an opportunity to pass on the left, such person in charge thereof is liable to a fine of $5 and damages.

MISSOURI—Approved March 19, 1907

DEFINITIONS—Auto driver means any per son operating a motor-vehicle as mechanic, paid employee, or for hire.

REGISTRATION—Non-residents need not register unless they remain in the State 20 days or more. The registration fee is $5.00. Such non-resident however must have complied with the registration laws of his own State and display the registration number tags of such State on the front and back of the vehicle. The act states that the front number tag must be illuminated.

Non-resident auto-drivers are entitled to the same exemption for a period of not more than 20 days provided they have complied with the laws of their own State requiring auto-drivers to be licensed and display such license number. The fee for a license is $2.00.

EQUIPMENT—1. From sunset to sunrise at least two white lights must be displayed visible at least 200 feet in the direction the vehicle is going and at least one red light visible in the opposite direction.
2. Good and suitable brakes.
3. Suitable bell, horn or other signal device.

SPEED REGULATIONS—1. Never greater than is reasonable and proper, having regard for traffic, use of the highway and the safety of the public.
2. Never greater than 15 miles per hour in any event.
3. When turning the corner of intersecting roads or streets, when traversing a curve or turn in the road where the view is obstructed, never greater than 6 miles per hour.
4. Never greater than 8 miles per hour in business portions of any city, town or village.
5. Never greater than 10 miles per hour in other portions thereof.

STOP WHEN—1. In case of accident, upon request of person injured or "property damaged," stop, and upon request of any person present give name and address of owner. (According to the act the "damaged property" must request you to stop. You have nothing to do with the mute appeal of a dying hen or broken fence.)
2. Upon signal by holding up hand or upon request from person in charge of horse, stop, to permit same to pass. Stop motor if requested. Male occupants of motor-vehicle must, upon request, give personal assistance.
3. Keep a vigilant watch, especially for vehicles driven by women and children and upon approaching such stop and enable them to pass. Stop motor if necessary.

WARNINGS—1. Give warning before passing vehicles driven by women or children from the rear.

RULES OF THE ROAD—1. Seasonably turn to the right of the center of the highway.
2. Person in front upon being overtaken by a motor-vehicle must as soon as practicable turn to the right to permit same to pass on the left.
3. At intersections of public highways keep to the right of the center when turning right, pass to the right of the center when turning left.
4. No person shall give a signal of distress or call for assistance without reasonable cause.

LOCAL ORDINANCES—

UNLAWFUL ACTS—1. See subdivision (4) under Rules of the Road.

PENALTY—The first offense for violating the provisions of this act carries a fine of from $25 to $100. Upon conviction of a second offense all rights and privileges given are forfeited.

MONTANA—Code 1907

REGISTRATION—No registration required.

EQUIPMENT—The act is silent upon this point. It will do no harm, however, to carry lighted lamps after dark.

SPEED REGULATIONS—1. Must not exceed 20 miles an hour outside of limits of a city, fire district, or thickly settled or business part of a town.

2. Must not exceed 8 miles per hour inside of same.

3. In approaching and traversing crossways and intersecting ways run at a less speed than above specified and never greater than is reasonable and proper.

STOP WHEN—1. Exercise every reasonable precaution in approaching a horse on the highway, and if horse appears badly frightened reduce speed. Stop when requested by signal or otherwise by person in charge.

RULES OF THE ROAD—When vehicles meet, drivers of each must turn seasonably to the right of the center of the worked portion, or beaten track in case of snow, of the highway, under penalty of $25.00 to be recovered by the party injured.

PENALTY—Fine not exceeding $100 or imprisonment not exceeding 60 days, or both.

NEBRASKA—In Effect July 5, 1907

REGISTRATION—Non-residents need not register provided they have complied with the registration laws of their own State and display the license tag issued by such State upon the rear of the vehicle at least.

EQUIPMENT—1. Good and sufficient brakes.

2. Suitable bell, horn or other signal.

3. From one hour after sunset to one hour before sunrise display one or more white lights on the front and a red light on the rear.

SPEED REGULATIONS—1. Never greater than is reasonable and proper, having regard for traffic, use of the highway and safety of the public.

2. Must not exceed 10 miles per hour in closely built-up portions of a city, town or village.

3. Must not exceed 15 miles per hour elsewhere in a city, town or village.

4. Must not exceed 20 miles per hour outside.

5. Upon approaching and in traversing a crossing, bridge, sharp curve and steep descent, car must be under control and running at a speed less than above mentioned.

STOP WHEN—In meeting horses in the highway, upon request or signal by putting up hand from person in charge thereof, stop and remain stationary as long as is reasonable to permit same to pass.

RULES OF THE ROAD—Upon overtaking a horse in the highway use reasonable precaution in passing and render any assistance that may be necessary.

LOCAL ORDINANCES—1. Local authorities cannot require local registration or license.

2. Cannot exclude properly registered vehicles from the highways.

This act does not expressly forbid local speed regulations.

PENALTY—A fine of not over $25.00 for the first offense.

NEW HAMPSHIRE—Act of March 10, 1905, as Amended April 9, 1909

REGISTRATION—Automobiles owned by non-residents may be operated in this State for 10 days continuously, at the expiration of which time they must be registered. Chauffeurs registered in another State may operate subject to revocation or suspension of this right for cause.

The owner when operating the car himself should be accompanied by a registered chauffeur; however, there is nothing in this act that expressly states that the owner must have a driver's license to operate.

EQUIPMENT—1. An adequate brake.

2. An efficient muffler or silencing device which shall be constantly maintained in use whenever the vehicle is operated within business districts of the compactly built sections of cities and towns.

3. Suitable bell, horn or other means of signalling.

4. Display lighted lamp one hour after sunset to one hour before sunrise.

SPEED REGULATIONS—1. Never greater than 25 miles per hour outside of business district or compactly built sections of cities and towns. Sections are compact if buildings average less than 100 feet apart for 1-4 mile.

2. Nor within same greater than 10 miles per hour.

3. Traversing a crossing, going round a corner or curve which cuts off a free view of the road to be traversed, or traversing a highway bordering a steep descent, or passing over a bridge, run slower than above specified, at no time greater than is reasonable or proper, having regard to traffic, use of the highway and safety of the public.

4. Reduce speed if horse appears frightened.

STOP WHEN—Upon approaching a horse exercise every reasonable precaution to prevent frightening same. If requested by signal, stop, and in case of extreme fright upon request stop motor.

WARNINGS—Traversing a crossing or going round a curve or corner sound bell or horn.

PENALTY—First offense, fine of not exceeding $10 and costs.

Second and subsequent offenses, fine not exceeding $50 and revocation of license or privilege. Privilege granted non-resident will not be renewed before the expiration of three months from date of revocation or suspension except for good reasons shown.

NEW JERSEY—Act of April 12, 1906, as Amended 1908, 1909 and 1910

REGISTRATION—Non-residents must obtain a tourist's license before they will be permitted to operate in this State. These special tourist's licenses are good for one period of 8 days in one calendar year or four periods of 2 days each. Every driver must be licensed, but a license will not be granted to anyone under the age of 16. Only one license a year will be granted. These special licenses may be procured at various places outside of the State. Write the Commissioner of Motor Vehicles for the desired information. The Pennsylvania owner may register at 1617 Land Title Building or the Automobile Club of Philadelphia, corner South Broad and Locust streets, Philadelphia, or at 211 Market street, Camden.

The application must contain the name and residence of the owner, maker's name, number and horsepower of the vehicle, identification number issued by the State in which said non-resident shall be a resident, must be accompanied by a fee of $1.00 and a duly executed instrument must be filed with the Secretary of State constituting him your attorney to accept service of process.

EQUIPMENT—1. Every motor-vehicle must have devices to prevent excessive noise, annoying smoke and the escape of gas and steam, as well as the falling out of embers or residue from the fuel; and all exhaust pipes carrying exhaust gases from the engine shall be directed parallel to the ground or slightly upward.

2. Chains, blocks, hobs or studs extending more than 3-8 of an inch from the surface of the tire are forbidden upon gravel, macadam or other made roads, except natural dirt, asphalt, cobble, Belgian blocks or vitrified pavements. Chains may be used, however, when said gravel, macadam or made roads are covered with a coating of at least one inch of ice or snow.

3. From 30 minutes after sunset to 30 minutes before sunrise two lighted lamps must be carried, visible at least 250 feet in the direction in which the vehicle is going and a red light visible in the opposite direction. And whenever fog renders it impossible to see a long distance lights must also be displayed as above.

4. License number plates must be displayed on front and rear of vehicle not less than 15 nor more than 36 inches from the ground. Must be kept clear and distinct so as to be visible at all times, day and night.

5. Must have a plainly audible signal trumpet.

6. Must have two brakes on cars of over ten horsepower.

SPEED REGLATIONS—The following rate may be maintained but not exceeded.

1. One mile in seven minutes upon curves and when turning corners.

2. One mile in four minutes at junctions or intersections of prominent cross roads where such a street, road or highway passes through the open country.

3. One mile in five minutes where houses are on an average less than 100 feet apart.

4. One mile in four minutes within 200 feet of any horse or beast of draught or burden. May travel at the rate of 25 miles per hour if necessary to pass a vehicle traveling in the same direction, after doing so speed must be diminished to comply with this act.

5. A maximum speed of 25 miles per hour may be maintained except as limited above, but speed must always be reasonable and proper and these provisions do not apply to speedways for motor-vehicles where there are no public crossings.

STOP WHEN—1. In case of accident stop, return and give name and number of license to any proper person demanding same.

2. Stop on signal from person riding or driving a horse or horses in opposite direction long enough to allow same to pass.

RULES OF THE ROAD—1. Keep to the right. All vehicles are required to keep to the right to permit an automobile to pass on being overtaken.

2. No racing on highways permitted.

LOCAL ORDINANCES—1. Local authorities have no power to limit or restrict the free use of the highways by motor-vehicles or to regulate the speed at which they may be operated.

2. The State authority is paramount.

UNLAWFUL ACTS—1. See Rules of the Road, subdivision (2).

2. See Equipment, subdivision (2).

3. No intoxicated person shall drive a motor-vehicle.

4. Driving for a wager.

5. For the purpose of breaking a speed record.

6. Wilfully failing to display proper registration or identification marks.

7. Displaying false registration marks.

TRIAL—1. Process may be served on Sunday and hearing may be had on Sunday.

2. Any constable, police officer, motor-vehicle inspector or the Commissioner of Motor Vehicles may arrest without warrant upon view but not upon information.

3. Upon demand of magistrate produce license for inspection. Failure to do so may mean an additional fine of not more than $25.

4. If defendant be found not guilty no costs can be imposed upon him.

5. The hearing may be adjourned for thirty days at the request of the accused upon giving a cash deposit or bond not exceeding $500, or leaving motor-vehicle. In such case take a receipt from the magistrate or officer.

PENALTY—For speeding, not over $100 fine for first offense.

NEW YORK—Became a Law May 31, 1910

DEFINITIONS—Public highway includes any highway, county road, State road, public street, avenue, alley, park, parkway or public place in any county, city, borough, town or village, except any speedway which may have been or may be expressly set apart by law for the exclusive use of horses and light carriages.

REGISTRATION—The provisions of the New York act relative to registration and display of registration numbers do not apply to motor vehicles owned by a non-resident of the State, provided:

1. Such owner must have complied with the laws of his own State relative to the registration of motor vehicles.

2. Must display registration number tags of such State.

3. This exemption noted above extends for a period of ten days only in a year.

EQUIPMENT—1. Adequate brakes.

2. Bell or horn.

3. Must display at least two lighted lamps on the front and a red light on the rear from one-half hour after sunset to one-half hour before sunrise. Rear light in addition must render the numbers on rear plate visible for at least 50 feet.

SPEED REGULATIONS—1. A rate of speed in excess of 30 miles per hour for a distance of one-quarter of a mile is presumptive evidence of a rate of speed which is not prudent and careful. Must always drive in a careful and prudent manner.

2. Cities of the first class may regulate the speed of motor vehicles and prescribe traffic regulations with regard to the operation of motor vehicles.

3. Other cities and incorporated villages may regulate speed of motor vehicles on the public highways to a speed limitation of not less than 15 miles per hour in any case. Maintaining a greater rate for one-eighth of a mile is presumptive evidence of imprudent driving. However, it is essential that each city or village shall have placed conspicuously on each public highway signs of sufficient size to be easily readable:

CITY OF BLANK

SLOW DOWN TO — MILES

and also an arrow pointing in the direction where the speed is to be reduced or changed and also on further condition that such ordinance, rule or regulation shall fix the punishment for the violation thereof, which punishment shall, during the existence thereof, supersede those specified in subdivision 2, Section 290, of this chapter (See Penalty), but, except in cities of the first class shall not exceed the same.

Summary of Speed Regulations:

1. Maximum speed 30 miles per hour.

2. Minimum speed not less than 15 miles per hour where the local authorities have complied with the above conditions.

3. Cities of the first class may make their own regulations.

STOP WHEN—1. Stop on signal from person riding, leading or driving a horse or horses. Stop motor when horse appears badly frightened. Allow a reasonable time for horse to pass.

2. Slow down in approaching a street car receiving or discharging passengers. Stop if necessary for their safety.

3. In case of accident, stop, return, give name to any proper person.

WARNINGS—1. Signal must be sounded before every cross road outside the limits of any city or incorporated village.

2. Blow horn upon approaching pedestrians in the highway.

3. Sound horn when rounding corners where the view of the road is obstructed.

RULES OF THE ROAD—1. Pass to the right of the center of the road vehicles going in the opposite direction.

2. Pass to the left of the center of the road vehicles going in the same direction.

3. At intersections of public highways keep to the right of the intersection of the centers of such highways when turning to the right and pass to the right of such intersection when turning to the left.

LOCAL ORDINANCES—Local ordinances are prohibited and may consequently be disregarded, except:

1. Local authorities may exclude motor vehicles from cemeteries.

2. Motor vehicles used for commercial purposes from parks.

3. See Speed Regulations, subdivision (2).

4. See Speed Regulations, subdivision (3).

UNLAWFUL ACTS—1. No vehicle shall display the number plates of more than one State at any time.

2. No person under 18 shall operate or drive a motor vehicle unless accompanied by owner or a duly licensed chauffeur.

3. Person intoxicated must not operate a motor vehicle. Fine for this offense must not exceed $25.

TRIAL—1. In case of arrest you are entitled to an immediate hearing or admission to bail, not to exceed $100 if charge be a misdemeanor; $1,000 if charge be a felony, however, the felony provision as mentioned in the act has been held unconstitutional by a lower court decision.

2. If money is given officer must give a receipt in writing.

3. On appearance for the trial or hearing the bail or money forfeit must be returned.

PENALTY—1. For non-registration after 10 days, not over $50.

2. For breaking the speed limit, fine not over $100.

OBSERVATIONS—Where a different rate is not otherwise prescribed or permitted by law, any person or corporation maintaining a plank road, turnpike road or bridge and authorized, or which shall hereafter be authorized, to receive toll for the passage of vehicles over the same, may charge and receive for each and every motor vehicle a toll rate not greater than the maximum rate allowed by law for vehicles drawn by two horses. For motor vehicles designed for not more than two persons, a rate not greater than the maximum allowed for vehicles drawn by one animal.

NORTH CAROLINA—March 6, 1909

DEFINITIONS—Business portion of any city or village means the territory contiguous to a public highway which is at that point either wholly or partially built up with structures devoted to business.

REGISTRATION—Non-residents are subject to the same requirements and laws as resident owners and operators, provided that non-resident owner passing through the State is not required to register.

EQUIPMENT—1. From one hour after sunset to one hour before sunrise display two lighted lamps showing white lights visible a reasonable distance, and one red lamp in the rear. (This section construed strictly would imply that only two lamps may be carried on the front of the machine.)

SPEED REGULATIONS—1. Never greater than is reasonable and proper, having regard to traffic, use of the highway and safety of the public.

2. In any event must not exceed 25 miles per hour on any highway.

3. In the business portions within the corporate limits of any city or village must not exceed 8 miles per hour.

4. Outside the business portions within the corporate limits must not exceed 12 miles per hour.

5. Approaching and traversing intersecting highway, bridge, dam, sharp curve or steep descent, must be under control and must not exceed 5 miles per hour, having regard to traffic then on such highway.

6. Approaching animals slow down to a speed not exceeding 8 miles per hour.

STOP WHEN—1. In case of accident, stop and give assistance. Upon request of any person give name and address of owner and register number.

2. At request or signal from person in charge of horse guide motor vehicle to the right of the wrought or traveled portion of the highway and immediately bring it to a stop. Stop motor upon request. Use every reasonable precaution to insure safety of such person or animal, and to prevent frightening of the horse. The male chauffeur or driver and all male occupants over 15 upon request must render personal assistance if horse appears frightened.

WARNINGS—1. Give reasonable warning of approach.

RULES OF THE ROAD—1. When meeting vehicle traveling in the opposite direction reasonably turn to the right of the center of the traveled portion of the road. Person approaching must likewise turn to the right of the same.

2. At intersections of public highways, keep to the right of the center when turning right and pass to the right of the center when turning left.

3. When a motor vehicle overtakes a horse-drawn vehicle, or other motor vehicle and expresses a desire to pass, it is the duty of the person overtaken to turn to the right of the center of the traveled portion of the road and give person overtaking him an opportunity to pass.

LOCAL ORDINANCES—1. Local authorities may make regulations concerning speed only within parks or parkways of incorporated cities or towns. In such case signs must be erected at the entrance thereto conspicuously indicating the rate.

2. May exclude motor vehicles from cemeteries or burial grounds.

UNLAWFUL ACTS—1. An intoxicated person must not operate a motor vehicle.

2. Racing prohibited.

3. Operating upon a bet or wager.

4. Operating to make a speed record.

5. Not more than one set of license tags may be carried.

TRIAL—1. Person arrested has a right to an immediate hearing.

2. If such cannot be had must be released upon giving personal security equal in amount to double the maximum fine.

3. In lieu thereof may leave motor vehicle.

4. Demand a receipt from an officer taking the security.

PENALTY—First offense for violation of any of the provisions of this act, fine not over $50 and costs or not over 20 days, or both.

OBSERVATIONS—The provisions of this act do not apply to New Hanover county.

NORTH DAKOTA—Law of February 23, 1905, as Amended 1909, Chapter 42

REGISTRATION—No registration required for either resident or non-resident owners.

EQUIPMENT—1. Bell or horn.

2. Muffler must be used within cities, towns or villages, and when meeting or passing animal propelled vehicles.

3. Two lamps must be carried on the forward part of the machine, arranged one at each side. Nothing is said as to when they must be lighted.

SPEED REGULATIONS—1. Must not exceed 8 miles per hour within any town, village or city.

2. Must not exceed 25 miles per hour outside any town, village or city.

STOP WHEN—1. Outside of limits of any city, town or village stop upon signal from person in charge of animal propelled vehicle until same has passed.

RULES OF THE ROAD—1. Pass to the right upon meeting, left upon overtaking other vehicles.

2. Driver in front must as soon as is reasonable turn to the right to allow one-half of the road for the automobile to pass.

PENALTY—For violating any of the above provisions, fine of from $10 to $50 or jail until same is paid at the rate of $2 for each day in jail.

OHIO—Code of 1910, 6290-M6510, Law of Ohio

REGISTRATION—If non-resident owner has complied with the provisions of law in regard to motor vehicles in the State of his residence and complies with such provisions while operating and driving a motor vehicle upon the public highways of this State, and further provided that such sections are substantially in force as law in the State of his residence, he need not register while touring in Ohio.

A non-resident chauffeur, properly registered in Pennsylvania, need not register in Ohio, provided he wears his Pennsylvania badge.

EQUIPMENT—1. Sufficient brakes.

2. Suitable bell nut or other device for signaling.

3. From 30 miles after sunset to 30 minutes before sunrise show a red light on the rear of the car.

4. During the same period show three white lights, two on front and one on the rear. The rear white light must shine on the rear license number.

Penalty, not more than $25 for the first offense.

SPEED REGULATIONS—1. Operating a motor vehicle unreasonably or improperly with regard to traffic, rules of the road, width and safety of persons and property forbidden. Fine for the first offense not more than $25.

2. Must not exceed 8 miles per hour in the business and closely built section of a municipality.

2. Must not exceed 15 miles per hour in other portions thereof.

3. Must not exceed 20 miles per hour outside of a municipality. Fine for violation, not more than $25 for first offense.

STOP WHEN—1. In case of accident, stop on request of injured person and give name and address of owner.

2. Failure to stop when signaled carries a fine of not more than $25 for the first offense. Signal, however, must have been given in good faith.

RULES OF THE ROAD—1. A person driving a carriage or vehicle on a public turnpike, road or highway on meeting a carriage or vehicle shall keep to the right so as to leave one-half the road free. A person driving a motor vehicle must leave two-thirds of the road free.

LOCAL ORDINANCES—1. Local authorities shall not regulate the speed of motor vehicles by ordinance, by-law or resolution. This means all officers, boards and committees of counties, cities, villages and townships.

2. They have likewise no power to diminish the rates of fines mentioned above.

UNLAWFUL ACTS—1. Displaying wrong number upon motor vehicle. Fine, $25.

TRIALS—Defendant is entitled to an immediate hearing. If such cannot be had he must be released on his personal undertaking to answer trial secured by bail not more than the maximum penalty for the offense. The officer making the arrest may take this money and must give a receipt therefor if proper judicial officer cannot be found.

OREGON—1905, Chapter 136

REGISTRATION—Non-residents need not register provided they have complied with the requirements of law of their own State relating to registration and display license tags of said State.

EQUIPMENT—1. During the hours of darkness have fixed on some conspicuous part of machine at least one lamp, showing white to front and red to rear. License number should be painted on white part.

2. A muffler, which must not be "cut out" within limits of any city or village.

3. Good and efficient brakes.

SPEED REGULATIONS—1. Must not exceed 8 miles per hour in thickly settled or business portions of any city or village.

2. Must not exceed 8 miles per hour in country within 100 yards of a house.

3. Must not exceed 24 miles per hour outside of a city or village.

4. Over crossings or cross-walks within limits of any city or village must not proceed faster than one mile in 15 minutes.

5. Never greater than is reasonable and proper having regard for traffic, use of the highway and the safety of the public.

STOP WHEN—When horse is frightened, upon request or signal from person in charge thereof.

RULES OF THE ROAD—Usual rules of the road are in force.

UNLAWFUL ACTS—1. Racing in parks is forbidden.

TRIAL—The case must be heard at once. Upon request of the accused, however, it may be adjourned by depositing $50 as bail. If it is impossible to find a magistrate the arresting officer is authorized to take the $50 deposit. Demand a receipt in writing from such officer.

PENALTY—A fine of not over $25 for the first offense.

PENNSYLVANIA—Laws of 1909

REGISTRATION—Non-residents are exempt for a period of ten days if they have complied with the requirements of the State in which they reside, and display upon their motor vehicle number-tags that indicate the State by which they are issued and their register number.

This privilege does not extend to residents of States which do not extend similar privileges to residents of this Commonwealth. In addition to the above requirements a resident of this State must be designated, upon whom service of process may be served. The number-tags must be displayed as follows: must be parallel to the axles, kept free from oil, grease, etc., and between one hour after sunset and one hour before sunrise the rear number-tag must be illuminated. Not more than one set of number-tags may be displayed.

EQUIPMENT—1. Good and sufficient brakes.

2. Horn, bell or other signal device.

3. Between one hour after sunset and one hour before sunrise show at least two white lights visible not less than 200 feet in the direction in which the vehicle is proceeding and one red light visible in the opposite direction.

SPEED REGULATIONS—1. Never recklessly, or at a greater rate than is reasonable and proper, having regard to width, traffic, use of the highway and safety of the public.

2. Never exceed 24 miles per hour.

3. Where the local authorities have erected signs reading DANGER—RUN SLOW, do not exceed 12 miles per hour.

STOP WHEN—1. Upon signal from an officer.

2. When signaled by the driver of a horse.

3. When circumstances require stop engine until danger has been avoided.

4. In case of accident, stop, and upon request of person injured or anyone accompanying him, give name and address and that of the owner of the vehicle.

WARNINGS—1. Give warning when overtaking another vehicle.

2. When approaching any person walking upon the highway.

3. When approaching a horse or other draft animal, led, ridden or driven.

4. When approaching a street or road crossing where the local authorities have erected signs reading DANGER—BLOW YOUR HORN.

LOCAL ORDINANCES—1. Local authorities may not fix a rate of speed lower than that permitted by the act.

2. May not require a license tax or permit to operate upon the highways, or the registration of any motor vehicle.

3. No public road open to horse drawn vehicles shall be closed to motor vehicles.

4. In parks, the local authorities may reduce the speed limit, but not lower than that allowed other vehicles. Signs must be conspicuously placed indicating the rate permitted.

UNLAWFUL ACTS—1. Person operating while intoxicated. Penalty $100 to $300, fine or one year imprisonment, or both.

2. No motor vehicle shall be operated under any other number than that of its own registration. Nor shall any person operate any motor vehicle without the consent of the owner. Penalty not more than $100 fine or not more than one year, or both.

3. Unnecessary sounding of bells or horns or use of muffler cut-out when passing any other vehicles prohibited.

4. When a motor vehicle meets or overtakes a street passenger car which has stopped for the purpose of taking on or discharging passengers, the motor vehicle shall not pass said car, on the side on which passengers get on or off, until the

car has started and any passengers who have alighted shall have gotten safely to the side of the road.

PENALTY—$10 to $25 for the first offense except as indicated above. See UNLAWFUL ACTS.

RHODE ISLAND—Public Laws of 1908, Chapter 1592, as Amended 1909 and 1910

REGISTRATION—Non-resident owners may operate cars in Rhode Island if they have complied with the law of their own State relative to the registration of motor-vehicles, and display the license tags of such State and none other substantially as follows: They must be placed on the front and rear and must not swing. This exemption is good for but ten days in a calendar year, after that time you are required to register. Also if you are convicted of violating any of the provisions of Sections 11, 12 and 13 you will be immediately required to register. These sections will be noted below.

EQUIPMENT—1. Adequate brake.
2. Suitable bell, horn or other device for signaling.
3. A muffler.
4. From one hour after sunset to one hour before sunrise display one or more white lights on the front of the car. Also a red light on rear throwing a white light on rear marker.
5. A lock and key to prevent said motor-vehicle from being set in motion and must be so locked when left unattended.
6. Chains must not be used on gravel, macadam or other made roads, except natural dirt, asphalt, cobble, Belgian block, or vitrified brick, except when reasonably necessary for safety in case of slippery roads.

SPEED REGULATIONS—Section 11. 1. Never greater than is reasonable and proper, having regard to traffic, use of the highway, safety of the public, etc.
2. In closely built-up sections never greater than 15 miles per hour.
3. Elsewhere never greater than 25 miles per hour.
4. Approaching and traversing crossings of intersecting highways, bridge, sharp turn, curve, or steep descent, machine must be under control and speed reduced. Signal of approach must be given.
5. Approaching persons or animals on the highway speed must be reduced and signal of approach given.

STOP WHEN—Section 12. 1. In case of accident stop and return to the scene of the accident. Give to any proper person demanding same number of driver's license, register number, and name and address of all the male occupants.
2. If horse appears frightened, or if signaled to do so by the person in charge thereof, stop both machine and motor immediately.

WARNINGS—Section 12. See subdivisions (4) and (5) under SPEED REGULATIONS.

RULES OF THE ROAD—Section 12.
1. Seasonably turn to the right.
2. Signal desire to pass when overtaking. Vehicle in front must seasonably bear to the right to permit passing on the left.
3. At intersections slow down and go to the right of the center of the intersection when turning right and pass to the right of the center when turning left.

LOCAL ORDINANCES—Cities or towns are forbidden to make any ordinance, by-law or resolution respecting rate of speed of motor-vehicles, except:
1. May exclude motor-vehicles from certain roads, not State roads or main highways leading from town to town. Such roads are to be designated by public signs.
2. May regulate the use of parks.

UNLAWFUL ACTS—Section 13.
1. Motor-vehicle must not be operated when driver is intoxicated.
2. In a race.
3. On a bet.
4. Or for the purpose of making a record.

PENALTY—For violating sections 11 and 13, for the first offense, not over $200 fine, or not over 30 days in jail, or both.

For violating section 12, not over $100, or not over 30 days, or both.

OBSERVATIONS—The phrase closely built-up under subdivision (2) of SPEED REGULATIONS means, in addition to the ordinary meaning: "The territory outside a city or village contiguous to a public highway within a distance of one-half mile from any post office; provided, dwellings average 100 to ¼ mile and provided proper authorities have erected signs conspicuously showing 'Slow Down to 15 Miles an Hour,' with an arrow pointing in the direction where the speed is to be reduced."

Subdivisions (4) and (5) under Speed Regulations are a part of Section 12 of the act.

SOUTH CAROLINA—Act of 1905 as Amended 1906

REGISTRATION—Non-residents are not mentioned in these acts. Every owner, according to Section 1, is required to register. The registration fee is $1, and registration is made before the clerk of any county court. Section 2 requires the display of a marker on the back of the machine showing the name of the county in which the certificate is filed and the registered number. If this act should be strictly construed these provisions must be complied with even by non-residents.

EQUIPMENT—1. Good and efficient brakes.
2. Suitable bell, horn or other signal.
3. "During the period necessary from or after sunset until not necessary before sunrise" show a white light in front and a red light in rear. In case of heavy fog lights must be carried during the day.

SPEED REGULATIONS—1. Never greater than is reasonable and proper, having regard to traffic, use of the highway, safety of the public, etc.
2. Must not exceed 15 miles per hour in any event.
3. Approaching and traversing crossing, sharp curve, bridge, or steep descent must be under control and not exceeding 6 miles per hour.
4. Reduce speed if horse appears frightened and do not exceed 3 miles per hour.

STOP WHEN—1. Stop upon signal from person in charge of horse.
2. Stop motor if horse appears badly frightened.

WARNINGS—1. Upon approaching give warning.

RULES OF THE ROAD—1. Seasonably turn to the right of the center of the road.
2. Driver of vehicles, upon being overtaken, shall as soon as possible turn to the right to permit passage on the left.
3. Go to the right of the center of intersecting highways when turning to the right and pass to the right of the center when turning to the left.

PENALTY—Not less than $10 nor more than $100.

SOUTH DAKOTA—Laws of 1905, Chapter 137

REGISTRATION—Non-residents need not register provided they have complied with the laws of their own State relative to the registration of motor-vehicles and display the license tags of such State upon the rear of the machine at least.

EQUIPMENT—1. Good and efficient brakes.
2. Suitable bell, horn or other signal.
3. From one hour after sunset to one hour before sunrise display one or more white lights in front and one red light in rear.

SPEED REGULATIONS—1. Never greater than is reasonable and proper, having regard to traffic, use of the highway, safety of the public, etc.
2. In closely built-up sections never exceed 10 miles per hour.
3. Elsewhere in any city, town or village never exceed 15 miles per hour.
4. Outside the limits of any city, town or village never exceed 20 miles per hour.
5. Upon approaching and in traversing a crossing, bridge, curve and steep descent run at a less speed than above indicated.

STOP WHEN—1. On request or signal by person in charge of horse upon the highway or within one hundred feet of the highway, stop.
2. If horse appears frightened stop, whether signaled or not.

LOCAL ORDINANCES—Local authorities cannot prohibit motor-vehicles from the highways or require a license to operate. Nothing mentioned about speed regulations.

PENALTY—For the first offense not over $25.

TENNESSEE—Laws of 1905, Chapter 173

REGISTRATION—The act provides that before any owner may operate a motor-vehicle upon the public highways he must register motor-vehicle with the Secretary of State and pay a fee of $2. He must further, after receiving the certificate from the Secretary of State, register the certificate with the county court clerk of the county in which said owner resides. Fee for this is $1. The act also provides that markers must be carried in a conspicuous manner on both the front and rear of the vehicle. There is no exemption of non-residents stated in this act, but it is obvious that these provisions are not intended to apply to non-residents, they of course having no residence in any county of the State.

SPEED REGULATIONS—1. Never exceed 18 miles per hour.
2. Municipalities may prescribe lower maximum rates within their corporate limits.

STOP WHEN—Stop when approaching horse which appears frightened.

WARNINGS—In passing from the rear give suitable warning and give time for driver of the horse to get down and hold it before passing.

LOCAL ORDINANCES—See subdivision (2) of Speed Regulations.

PENALTY—Not less than $25 nor more than $100.

TEXAS—Act of 1907, Page 193

REGISTRATION—No provision regarding non-residents in this act. Every owner before operating an automobile on the public highways is required to register with the clerk of the county court of the county of his residence. The fee is 50 cents. It is manifestly impossible for a non-resident to comply with the letter of this law, having no residence in any county.

EQUIPMENT—1. Suitable bell or other appliance must be able to be heard at least 300 feet.
2. Carry a lighted lamp from one hour after sunset until one hour before sunrise. The act does not mention where the lamp is to be placed.

SPEED REGULATIONS—1. Limit 18 miles per hour.
2. Within built-up portions of any city, town or village, 8 miles per hour.
3. City or town may allow a greater rate of speed.
4. Never greater than is reasonable and proper, having regard to traffic, use of the highway, safety of the public, etc.

STOP WHEN—Stop on signal or request to permit horse to pass.

LOCAL ORDINANCES—See subdivision (3) under Speed Regulations.

UNLAWFUL ACTS—Racing on public highways prohibited.

PENALTY—Not less than $5 nor more than $100.

UTAH—Act of 1909, Chapter 113

REGISTRATION—Non-residents need not register provided they have complied with any law requiring the registration of owners of motor vehicles in force in the State or Territory of their residence and display the license tags of such State, securely fastened so as not to swing, upon the rear of the vehicle at least.

If the act is strictly construed non-resident chauffeurs would be required to register. The fee is $2. Owners may operate their own cars, however, without registering or taking out a driver's license.

EQUIPMENT—1. Good and efficient brakes.
2. Suitable bell, horn or other signal.
3. From one hour after sunset to one hour before sunrise display two white lights in front and one red in rear.
4. Muffler. See Unlawful Acts.

SPEED REGULATIONS—1. Never greater than is reasonable and proper.
2. In closely built-up portions do not exceed 10 miles per hour.
3. Elsewhere in any incorporated city, town or village do not exceed 15 miles per hour.
4. Elsewhere outside any incorporated city, town or village do not exceed 20 miles per hour.
5. Upon approaching and in traversing a bridge, dam, sharp curve, dugway, or steep descent, machine must be under control and not exceeding 6 miles per hour.
6. Approaching crossing of intersecting highways must not exceed 6 miles per hour.
7. Reduce speed upon approaching horses in the highway.

STOP WHEN—1. Stop at request or signal if horse appears frightened.
2. In case of accident stop and upon request of any person present give name and address of owner.

RULES OF THE ROAD—1. Reasonably turn to the right so as to give vehicle approaching half the traveled road.
2. Person overtaken by another shall give latter a convenient opportunity to pass on the left.

LOCAL ORDINANCES—1. Local authorities may not prescribe a lower rate of speed than is permitted by the act.
2. They may not require a license or a permit to use the highway.

UNLAWFUL ACTS—1. Must not use exhaust cut-out when approaching or passing horses.

PENALTY—The same as in misdemeanor cases. A small fine with the alternative of a limited number of days in jail in case of non-payment.

VERMONT—As Amended January 28, 1909

REGISTRATION—Residents of Pennsylvania are exempt from registering while touring in Vermont for a period not exceeding ten days. For a period exceeding ten days and not more than 60 days must pay a license fee as follows:

20 horse-power or less	$3.00
20 to 40 horse-power	6.00
40 horse-power and over	10.00

If operated for more than 60 days you are required to register as a resident.

The vehicle must have been properly registered in your own State and the license tags of such State displayed substantially as follows: One in front, plainly visible, another in the rear. Must not be arranged so that they may be turned down or covered. Must be always legible. The register number may be painted on the front of the radiator in lieu of the front number plate.

Section 4687 of this law excludes non-licensed operators from the highways. However, if operator is licensed in another State he may operate for a period not exceeding ten days without procuring a license. He must display the license tag of such State. The Secretary of State furnishes blanks for applications. The fee for an operator's license is $2.

It is further provided that if you are convicted of violating this section or the sections relating to running and operating the special license or privilege may be revoked.

Penalty for violating these provisions regarding registration not over $200 fine or not over ten days in jail, or both.

EQUIPMENT—1. An adequate brake.
2. A muffler.

3. Suitable bell, horn or other means of signalling.
4. From one hour after sunset to one hour before sunrise display lights. From sunset to sunrise, however, the rear number plate must be illuminated.
5. Lock, key or other device to prevent machine from being set in motion by its own motive power. Must never be left unattended without being locked.

SPEED REGULATIONS—1. Never run in a careless or negligent manner.
2. Exceeding 25 miles per hour outside a city or incorporated village; or,
3. Exceeding 10 miles per hour within such city or village or thickly settled part of a town; or,
4. Exceeding 10 miles per hour across any bridge of more than 50 feet span, shall be prima facie evidence of careless and negligent running.

STOP WHEN—1. If horse appears frightened, stop. Do not advance until signaled to do so by the person in charge thereof.

WARNINGS—In going round a corner or curve, or approaching an intersection, signal.

RULES OF THE ROAD—Exercise every reasonable precaution to prevent frightening horses.

LOCAL ORDINANCES—Local authorities may make special regulations upon narrow and dangerous ways. To be effective, however, notice must be conspicuously posted a reasonable distance from such way.

UNLAWFUL ACTS—Do not operate or attempt to operate while intoxicated.

PENALTY—For excessive speed not over $50 fine, or not over ten days in jail, or both, with costs. If costs appear excessive ask magistrate to let you see his fee list or schedule.

VIRGINIA—Law of March 17, 1910

REGISTRATION—Non-residents may operate machine upon the highways of Virginia not exceeding two periods of seven consecutive days each in a calendar year, provided they have complied with the laws of their own State requiring registration of motor-vehicles or licensing of operators. They must display the registration numbers or markers of such State and none other. If you are convicted of violating any of the provisions of sections 8, 9, 11, 12, 13, you will be required to register. A chauffeur is required to take out a license if he is not licensed in the State of his residence. A member of the owner's family may operate, however, without a license. The reciprocity clause in this act might possibly be construed to permit a resident of Pennsylvania but ten days' exemption in Virginia but the authorities are not prone to quibble over this clause. The important sections of this act will be noted as they occur.

EQUIPMENT—Section 13. 1. Lock, key or other device to prevent machine being set in motion. Must never be left unattended on the highways without being locked.
2. Good and sufficient brakes.
3. Suitable bell, horn or other signal device.
4. From one hour after sunset to one hour before sunrise show at least one white light throwing a bright light at least 100 feet in direction vehicle is going and a red light visible in the opposite direction. Rear number plate must be illuminated.

SPEED REGULATIONS—Section 8. 1. Within corporate limits of any city or town never exceed 8 miles per hour except in cases where the local ordinances of such city or town shall provide otherwise.
2. Outside the corporate limits of any city or town a speed of 20 miles per hour is permissible, except going round curves, down sharp declines, or at the intersection of any cross roads, or over the crest of hills, or in passing other vehicles or riders on roadways, when a rate of speed not exceeding 8 miles per hour must be observed.
Section 11. 3. A speed of 8 miles per hour may be maintained but not exceeded around curves or bends, or when the roadway is not plainly visible for a distance of three hundred feet ahead, at the intersection of prominent cross-roads.
4. When the operator of an automobile overtakes a vehicle and indicates a desire to pass, it shall be the duty of the driver of the vehicle to bear to the right and decrease his speed to less than 8 miles an hour, so as to enable the automobile to pass at the left at a speed not exceeding 8 miles per hour.
5. Do not exceed 8 miles per hour where the street or highway passes the built-up portion of a city, town or village.
6. Do not exceed 8 miles per hour at points on a public highway where there is a gathering of men or horses. Otherwise the rate may be 20 miles per hour subject to the conditions set forth in section 8.

DUTIES OF DRIVER—(This is the title of the following provisions under the Virginia act and it was thought best to retain the title in this case rather than confuse the tourist in following the provisions of these two sections which are important. This title therefore includes the usual titles Stop When, Warnings, Rules of the Road.)
Section 12—1. Keep a careful look ahead for horses, etc.
2. Upon approaching horses, etc., slow up. Keep machine under control. Give ample roadway. Stop both machine and engine if signaled or requested.
3. Upon request male occupant of automobile must lead a horse past his machine.
4. If horse appears frightened stop both car and engine.
Section 13—5. When approaching a curve, bend or any place where the roadway is not plainly visible for a distance of 300 feet ahead keep to the right of the road.
6. When approaching horses, etc., going in the same direction slow down. Signal for the road. If horse or other vehicle stop, pass it at a rate not exceeding 8 miles per hour.
7. If horse, etc., does not stop, express a signal to pass, but use no greater speed than is necessary.
8. In passing, provisions of section 12 apply, except when horse is held until machine gets by.
Section 9—9. It shall be the duty of the owner or the driver of any machine to produce his certificate for inspection when so requested by the sheriff or any constable, policeman or other police officer.

PENALTY—For each offense not less than $10 or not less than 5 nor more than 30 days in jail, or both, for the violation of any provision or failing to perform any duty imposed by the act.

WASHINGTON—Laws 1909, Section 279, as Amending Laws of 1905

REGISTRATION—Non-residents need not register provided they have complied with the laws of their residence requiring the registration of owners of automobiles and that they display the license tag or marker of such State upon the back of the vehicle at least.

EQUIPMENT—1. During the hours of darkness show at least one lighted lamp conspicuously placed showing white to front and red to rear.
2. A muffler must be used and not cut-out or disconnected within the limits of any city.
3. Good and efficient brakes.
4. Bell or horn—must be sounded whenever there is danger of collision or accident.

SPEED REGULATIONS—1. Within thickly settled or business portions of any city or town do not exceed 12 miles per hour.
2. Over any crossing, crosswalk or street intersection within limits of any city or town, when any person is upon the same, do not exceed 4 miles per hour.
3. At any other place do not go faster than 24 miles per hour.
4. Never go at any unsafe or unreasonable rate, having proper regard for the safety of others.

STOP WHEN—If horse appears frightened reduce speed and stop if requested by signal or otherwise by person in charge thereof.

WARNINGS—See Equipment, subdivision (4).

RULES OF THE ROAD—1. Usual rules of the road.
2. Exercise every reasonable precaution to prevent frightening horses.

LOCAL ORDINANCES—Local authorities cannot exclude properly registered vehicles from the highways nor require any other license, except for vehicles for hire. Cities of the second class may regulate the speed of automobiles. It has been decided that a city may limit the speed to 6 miles per hour under the motor law of 1905.

PENALTY—Fine, not exceeding $100.

WEST VIRGINIA—Supplement 1909

REGISTRATION—The act requires that all persons operating an automobile upon the highways of West Virginia shall take out a license. This provision is not often enforced as regards non-residents, but tourists have been arrested and fined for failing to register in this State. The registration fee is $10.

Licenses are granted by the auditor. Penalty for not having a State license is $20 to $100. Markers issued by the State must be carried on both front and rear of vehicle. Licenses are granted to the owner.

WISCONSIN—Laws of 1909, Chapter 500

REGISTRATION—Non-residents need not register provided owner has complied with the laws of his own State requiring the registration of motor vehicles and displays on the rear of the vehicle at least the markers of such State conspicuously, so that they shall be visible at all times. Non-residents passing through this State from States having no registration laws will be required to register. This, of course, does not apply to residents of Pennsylvania. The registration fee is $2.

EQUIPMENT—1. From one hour after sunset to one hour before sunrise display on the front of the vehicle at least one white light giving a reasonably bright light.
2. Brakes.
3. Bell, horn or other signal device.

SPEED REGULATORS—1. Within the corporate limits of any city or village must not exceed 12 miles per hour.
2. Outside the corporate limits of any city or village must not exceed 25 miles per hour.
3. Turning corners, going round curves, at sharp declines, intersections, where view is obstructed, reduce speed to such a rate as will tend to avoid accident.

Penalty, $10 to $25 fine.

STOP WHEN—1. Stop on request or by signal by putting up hand from person in charge of horses unless a movement forward is necessary to avoid injury. Upon request stop motor. If requested assist such person to pass. Penalty, $10 to $25 fine.

RULES OF THE ROAD—Automobiles have as much right to the highway as any other vehicle.

LOCAL ORDINANCES—Local authorities have no power to require local registration or to exclude properly registered vehicles from the highways, except parks and driveways under the control of certain corporations.

UNLAWFUL ACTS—1. Motor must be stopped when vehicle is left unattended.
2. No person may give distress signal without cause.

Penalty for subdivision (2), $10 to $25 fine.

DOMINION OF CANADA

Only the Provinces of Quebec, Ontario and New Brunswick will be considered, these being the three Eastern provinces of Canada bordering on the United States.

It being found on examination of the motor laws of these provinces that they are very similar to the laws of New York and Pennsylvania, only such provisions will be noted that are necessary.

The tourist may obtain much valuable information regarding registration, etc., at the Canadian customs houses.

QUEBEC

Residents of the United States must register in Quebec. The fee is $5. This can be done on entering the province, usually at the customs house. In case you have entered Quebec from another province of Canada, in which latter province you have registered, you are not necessarily required to register. Article 1393 of the laws of 1909 reading: "But the owner of a motor vehicle who resides in any other province of Canada shall not be required to register such vehicle . . . before using the same in Quebec, provided such vehicle bears a number indicating registration elsewhere." The carrying of fictitious number plates is prohibited.

Article 1399 requires "Every person who desires to operate a motor vehicle otherwise than as a chauffeur must previously obtain an operator's license valid for one year only. This is issued by the Provincial Treasurer or by some one appointed by him. Try at the customs house. "Before one is granted the applicant shall present such evidence of his qualifications as may be required by the Provincial Treasurer." A chauffeur is required to take out a license. The fee is $5. Blanks are furnished by the Treasurer's Department. Licenses expire April 1 of each year.

RULES OF THE ROAD—Same as in Pennsylvania. Keep to the right of the center of the road when meeting other vehicles and pass on the left when overtaking. At intersections, keep to the right of the center when turning right and pass to the right of the center when turning left.

EQUIPMENT—From one hour after sunset to one hour before sunrise carry two lamps showing white lights a reasonable distance in the direction the vehicle is going, showing the register number of the vehicle in separate Arabic numerals, not less than 1 inch in height and not less than 1-4 inch in width, and show a red light in the reverse direction. No motor vehicle shall carry what is known to the trade as a swivel searchlight.

SPEED REGULATIONS—Never greater than is reasonable and proper, having regard to traffic, use of the highway, etc.

Never greater than 9 miles per hour within a city, town or village or on any public highway where the territory contiguous thereto is closely built up.

Never greater than 15 miles per hour elsewhere.

Approaching a sharp angle, bridge or steep descent, or intersecting highways and crossings, reduce speed to 4 miles per hour.

WARNINGS—Signal upon approaching an angle in a highway or the intersection of two streets, or when coming into a street or highway from any garage, yard or private ground.

LOCAL ORDINANCES—No municipal corporation may require a license or permit to use the highways nor exclude motor vehicles from highways or prescribe a lower rate of speed. Motor vehicles may be excluded from parks and cemeteries and a lower rate of speed prescribed therein, in which case signs must conspicuously indicate the rate permitted.

OBSERVATIONS—Stop in case of accident, give name, address and register number upon request of any person present.

Motor vehicles must be locked when left unattended.

ONTARIO

Residents of the United States are required to register. The fee is $4. This can be done usually at the customs house. Number plates are issued without additional cost. These must be displayed, one on the front as far forward and as high from the ground as may be necessary to render it distinctly visible. The other number plate must be placed on the center of the back of the body of the motor vehicle, so that the lower edge of the plate is not lower than the body of the vehicle. The rear number must be illuminated at night. No number plate other than that issued by the department may be exposed on any part of the vehicle.

Paid drivers must be licensed. Licenses issued by the department of the Provincial Secretary.

EQUIPMENT—Display on the front a lighted lamp, in a conspicuous position, from dusk to dawn. License number is required to be painted on the front of the lamp in numbers at least two inches high. No motor vehicle shall carry what is known to the trade as a searchlight.

SPEED REGULATIONS—Never faster than 10 miles per hour within any city, town or incorporated village. Never faster than 15 miles per hour outside same. Must never drive recklessly.

Must not approach within a hundred yards of a horse, or pass same going in opposite directions, at a greater speed than seven miles per hour.

RULES OF THE ROAD—Same as in Pennsylvania.

STOP WHEN—Upon meeting or overtaking a funeral procession stop. Where practicable turn out into any intersecting road or street until funeral procession has passed.

In case of accident stop and return and give in writing to any one demanding name and address of owner and number of license or permit.

OBSERVATIONS—Motors to be locked when not in use.

No person under the age of 17 may drive a motor vehicle.

Penalty for violating the speed limit, $10 to $50, and costs.

NEW BRUNSWICK

The Secretary of the Department of Public Works will furnish registration blanks. Fee, $5. Non-residents of the province may use the highways without registration, provided they have complied with any law requiring the registration of owners of motor vehicles in force in the State or province of their residence and display the register numbers of such State or province. The chauffeurs' license fee is $2.

EQUIPMENT—One or more lights must be displayed from one hour after sunset to one hour before sunrise while the vehicle is in use.

SPEED REGULATIONS—Never greater than is reasonable and proper, etc.

In closely built-up sections within any city, town or village do not exceed one mile in eight minutes.

Elsewhere within any city, town or village do not exceed one mile in five minutes.

Outside the limits of any city, town or village do not exceed one mile in four minutes.

RULES OF THE ROAD—Seasonably turn to the left at the center of the highway when passing vehicles approaching from the opposite direction.

Pass upon overtaking on the right.

At intersections, keep to the left of the intersection of the centers when turning to the left, and pass to the left when turning to the right.

"Soldiering" Encouraged By Heads

Scientific Production Methods the Vogue

Destructive competition in plants has produced a state of mind of artisans generally that is founded upon a fallacious argument. The modern trend is in the direction of "Motion Studies," the idea being to conserve the energies of the men, showing them how to make more money for themselves, and to serve in the light of a good investment for their employers; moreover, the superstition that actuates them, inducing the fear that work will run out if the men do too much of it, must be erased from the slate.

ENGLISH builders of automobiles are unable to invade the world's market because the management of English shops is so poor that it is incapable of inspiring confidence in its workmen. Failure on the part of the English builders of cars may therefore be traced to "soldiering" on the part of the men, this being their method of telling their employers that they are lacking in ability.

There is an ancient superstition, which is of course a fallacy, but it is universal among English workmen, and it obtains to some extent in this country. It is founded on the idea that there is only a limited amount of work to be done, and that the men will be laid off if they overexert themselves, the fear being that they will run out of work. In the meantime, history has never shown that there was any limit to success, and certainly it is impossible to argue that a company will not be successful if its men do plenty of good work.

There must be a defect in the system of management, if it can be said of a plant that the men employed therein have so little confidence in their employers that they limit the amount of work that they are willing to do in a day on the ground that if they do a fair day's work for a fair day's pay, that faithful service will be rewarded in a negative sense in that the task will be consummated before the end of the year, and the men will be laid off.

Inefficiency is at the bottom of the whole situation, and rule-of-thumb methods run rampant among the trades. The little of scientific investigation that has found its way into the plants has been sufficient to show that the cost of investigating and the classifying of knowledge leads to better conditions all around. The product of a classified plant is superior in every sense to the work that is turned out under rule-of-thumb reign, and purchasers generally soon learn that an investment in a scientifically produced product has a permanent value that is not to be expected when the personal equation is not narrowed down, and the result is that the men who do work under classified conditions are assured of permanent employment for the very simple reason that their employers are assured of a ready sale for all of the product that they can place at the disposal of users, and the prices being better for good machines, the workmen can be given better pay for what they do.

SPLENDID AUTOMOBILE ROAD IN CUBA—In the vicinity of Santiago de Cuba there is a never-to-be-forgotten automobile road leading to the Boniato Summit; and thence to the villages of San Vicente and Cuabitas. This road is a monument to General Leonard Wood, it having been built during his administration on the Island. The official name of this road is the Santiago-San Luis calzada. There is a gigantic wall alongside, where, during the Spanish-American war times political offenders were shot. As if to decorate the memory of the scene, a million orchids dangle along the way. One cannot help saying that here is an ideal automobile road.

Discussing Problems of Lubrication

It is pointed out that controversy is frequently due to failure to grasp the point of view, and this is particularly true in dealing with the lubricating problem. It is held by eminent authority that the lubricating oil may be put into the gasoline and the two products may then be fed to the motor through the carbureter, thus doing away with the lubricating device and, in the vernacular of the day, "killing two birds with one stone." This plan works out in some cases, and fails utterly to supply exacting needs in other instances.

CERTAIN of the problems of the automobile are of the recurring type indicating the practical impossibility of keeping principles in sight and maintaining the status of the respective situations in the absence of conflict. Every little while the question of whether or not the lubricating oil should be put into the gasoline and then fed to the motor through the mixer is brought up, and attempt is made to establish the fact that this

is the right way to do the lubricating work under all sorts of conditions.

As an illustration of the impracticability of thus making one shoe fit all sizes of feet, attention is called to the practice abroad of using castor oil in the lubrication of long-stroke, single-cylinder motors as they obtain in racing work. Experience has shown that these motors running at 2,000 feet per minute of piston travel cannot be successfully lubricated by means of the best types of lubricators available, utilizing hydro-carbon lubricating oil of the type that serves so well in regular motor practice. It will doubtless be plain that the dissolving of castor oil in the gasoline and then putting it into the long-stroke motor in the manner above indicated would be a positive step in the direction of flat failure.

In response to this statement hot logic would say "this is the exception that proves the rule." Cold logic, on the other hand, might be used in establishing the dictum that there must be a rule before it can be proven. At all events, granting that hydro-carbon lubricating oil may be put in the gasoline and fed to the parts to be lubricated through the mixture, even this admission makes it necessary to consider the use of pure hydro-carbon lubricating oil, and few indeed are the automobilists who are capable of analyzing the lubricating product for the purpose of establishing its purity, whereas in the absence of this information the unfortunate automobilist who trusts to luck and the simplicity that comes when a separate lubricator is done away with is confronted by the disconcerting possibility that he will have to buy a new set of bearings for his motor.

Lubricating oil has several duties to perform, one of which, of course, is to supply the slippery surface which will permit the journals to roll in their bearings without letting them down to metal-to-metal contact. A second duty of the lubricating oil is represented when this produce is in slight excess, thus enabling it to creep out through the crevices and in its outward migration take foreign substances of the class that are trying to get in as far away from the bearings as possible. The third duty of the lubricating oil is to furnish insurance.

No keen business man will build a house and fit it out with costly works of art without calling upon an insurance broker, whose duty it will be to underwrite the property for the purpose of protecting the owner against loss by fire. The same type of business man when he buys an automobile has it, too, insured. It is not a far stretch to point out that this same principle of insurance must be present in the lubricating situation; every bearing will burn out unless it is properly lubricated, and the idea of risking the burning out of the bearings for no better purpose than to save a lubricator on the automobile is rather a poor one, especially if the owner of the car is compelled to accept the alternative of getting every gallon of lubricating oil that he buys analyzed by a capable chemist in order to make sure that it is a pure hydro-carbon product.

If there is any virtue in dispensing with the lubricator on an automobile, admitting that it is only a good idea when applied to the types of automobiles that will thrive under relatively poor conditions of lubrication, it still remains for some capable body of engineers to investigate the problem at sufficient length to enable them to decide with certainty as to the stopping-off place. It is highly improbable that good practice will sanction a hazard in any event, and certainly it is more prudent to put up with the vicissitudes such as they are of a well-contrived lubricating system than it is to risk burning out a costly set of bearings with the excellent chance of destroying a more costly crankshaft with nothing better in sight than a study in simplicity in the light of the fact that over 99 per cent. of all the automobiles made are equipped with lubricators of which it may be said they do the work that is primarily their function, and furnish the insurance that every prudent business man is accustomed to have at whatever cost.

Ramifications of the Hudson "33"

Depicting the Car Mechanically and in Some Detail

Illustrating and describing the Hudson Model "33" as made by the Hudson Motor Car Company, of Detroit, Mich., showing the mechanical refinements, pointing out the construction features of block type of motor, and indicating the means by which silence of performance is attained.

RATING the motor at 25.6 horsepower (A. L. A. M.) brings the cylinders, of which there are four and water-cooled, to a bore of 4 inches, the stroke being 4 1-2 inches. The general appearance of the motor, which is of the block type and designed for four-cycle performance, is shown in Fig. 1, which is

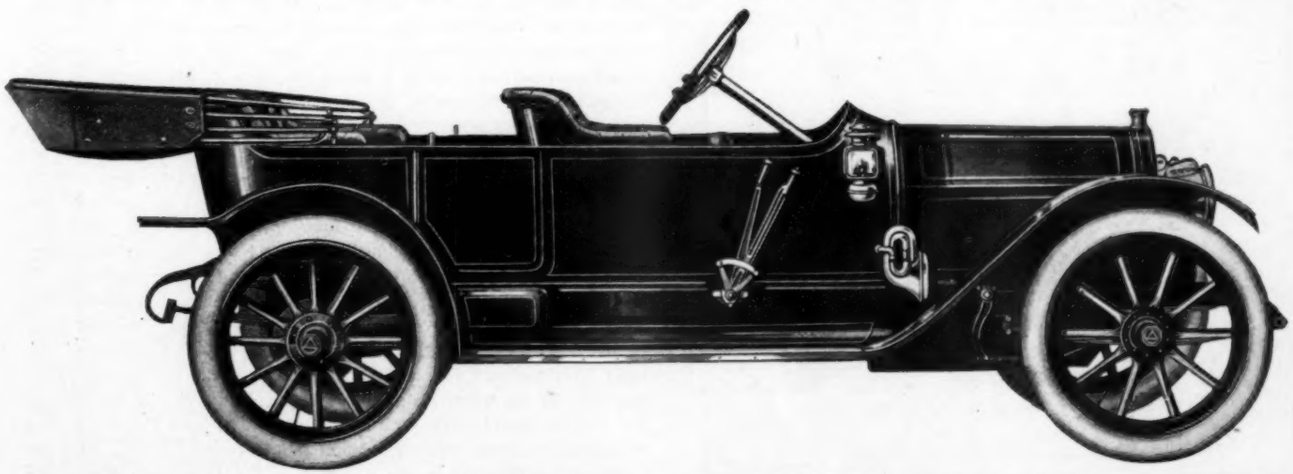


Fig. 11—Hudson "33" touring car fitted with a torpedo body, showing the side levers outside of the body line at the right side of the car, the entrance for the driver being at the opposite side.

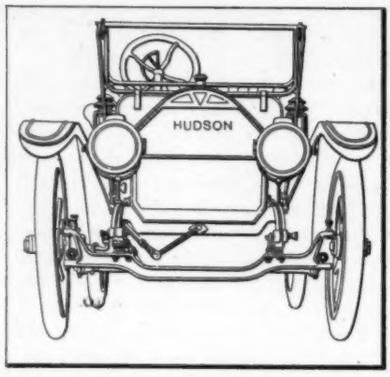


Fig. 6.—Looking at the front of the Hudson "33" complete, showing the shape of the radiator, drop of the front axle, and the protection afforded to the tie rod of the steering equipment

the left side of the motor, presenting the crankcase C2 with integral arms A1 on each side at the front and the embracing arms A2, with bearing faces F3 engaging the chassis frame, these arms circling around to bring the support in the plane of the flywheel, thus taking the torsional effort due to gyroscopic action off of the crankcase, hence eliminating it from consideration in connection with the transmission members, notably the crankshaft extension, clutch, transmission gear, etc. Looking again at the motor as presented in this view, the housing H1 for the half-time gears is cast integral with the crankcase C2, and instead of the case being made in the two halves of common practice, the longitudinal division line comes at the flanging of the oil bottom O1, and at the low point of this oil reservoir a connection is made leading to the oil pump O2, and the circulation of oil as it is induced by this pump presses onto the rotative members through a pipe connection with a pig-tail P1 in its length, and this pipe being of brass and annealed, in view of the use of the pig-tail, will withstand vibrations and other service conditions without danger of failing. Water is circulated by means of a centrifugal pump W1, the water coming in from the radiator through the fitting F1, which terminates in an enlargement at the axis of the pump, and the water travels from the pump to the water jackets through the fitting F2. The inlet valves are on the left side of the motor, the latter being cast with a T-head, and the exhaust manifold M3 of symmetrical design with a large area for the traversing of the exhaust products of combustion, is built with short necks, and is bolted against finished faces on the block casting adjacent to the transfer ports of the four cylinders in the block, thus permitting the gas to traverse the water-jacketed transfers and enter the manifold by the most direct and shortest route, with the least possible opposition, hence playing in favor of no back pressure. The cylinders C1 are of rounded contour, glancing at the exterior, and the water manifold M1 is of increasing sectional area from the back to the front, thus permitting the circulation of the water under the impetus of the pump W1 without large effort. The valve mechanisms are within a housing with covers C3 and C4, which may be removed by backing off wing nuts S1 and S2, and these covers, in addition to excluding foreign matter, muffle the slight tapping noise of the lifts as they contact with the stems of the valves. This illustration also shows the water pump W1 and the magneto M2.

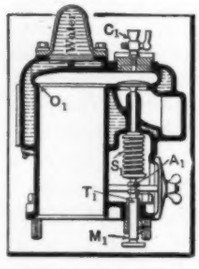


Fig. 2.—Section through one of the cylinders, showing uniform thickness of walls, good water jacketing and details of the housing system

Referring to Fig. 2, which is a section through one of the cylinders of the motor, it will be observed that the water extends around the dome of the cylinder and is carefully drawn around the metal which forms the seat of the valve; the valve stem guide is also water-jacketed. Moreover, the transfer port for the exhaust is direct and short, and these facilities, in addition to the use of large-diameter valves, considering the facilities for proper timing, lend the impression that the motor is thermally efficient, and that its range of stability has been given careful attention, as a matter of moment. This illustration shows also the method of covering the valve spring S1 and the tappet T1, and attention is called to the adjustment A1 whereby the timing of the valves is accomplished. Looking at the top of the stroke of the cylinder and the offset O1, it will be observed that the top ring on the piston is permitted to go by the finished face, and in this way the ring is prevented from burrowing into the metal of the walls of the cylinder. A cover is placed over each valve, and the priming cock C1 is located directly over the exhaust valve, thus leaving the cover over the inlet valve to serve as the receptacle for the spark plug for each cylinder. This section also shows a considerable quantity of water all around the jacket spaces terminating in a large volume of water over the dome, and this excellent idea is perpetuated by using a peculiarly shaped water manifold as the section indicates. The tappet terminates in a mushroom M1 which engages the cam on the camshaft, and the oilways in the tappet guide are so designed that the lubricating oil is not permitted to climb up and get away.

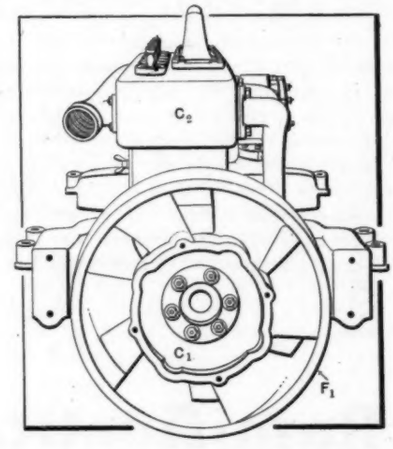


Fig 3.—Rear end view of the motor looking into the flywheel, showing fan veins for spokes and the cavity for the clutch

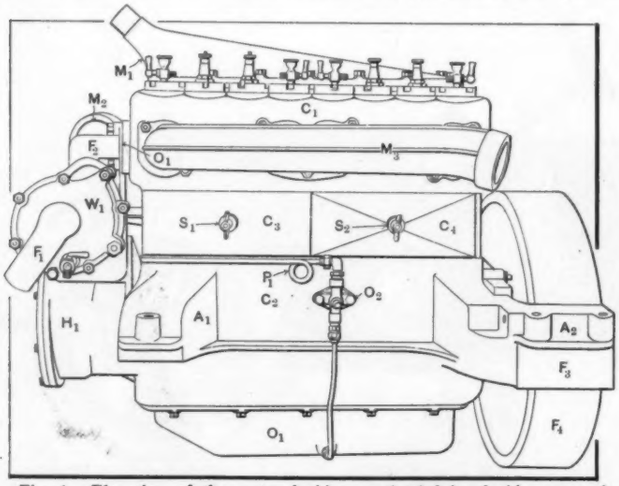


Fig. 1.—Elevation of the motor looking at the left-hand side, presenting symmetry of design and covers over the valve mechanism

Fig. 3 presents a rear view of the motor showing the fan in the flywheel F1 and the cavity C1 for the multiple-disc clutch, also the contour of the block casting C2, and Fig. 4 shows the flywheel F1 in section, and the face of one of the air veins V1, also the housing H1 for the multiple-disc clutch D1, and the drum S1, which serves as the inner carrier for the transmitting discs of the clutch, thrust being taken by a ball bearing B1 against the clutch spring S2, movement being imparted to the clutching members by a pedal in the usual way. The clutch is rendered oil-tight by the cover C1, and connection is made to the transmitting end of the same from the drum S1 through the key K1 to the tumble shaft with its flexible joint E1, and thence to the transmission gear, with the prime shaft carried on an annular type ball bearing B3 in the housing of the gearcase. From the crankshaft C2 power is transmitted to the clutch, and it is a

noteworthy fact that the clutch spring S2 is in the hollow of the crankshaft concentric with the rear end main bearing of the same. Fig. 5 is of the front end of the motor showing the magneto M1 at the right side and the centriugal water pump W1 at the left side, both being driven from the same lateral shaft system, taking power from the crankshaft through spiral gears in the housing H1.

The general appearance of the car, looking at the front, is shown in Fig. 6, and the details of the I-section front axle in plan and elevation are shown in Fig. 7 at A and B, in which it will be observed that the knuckles N1 and N2 are drop-forged, swiveling in Elliott type stub ends, and the knuckle pins P1 and P2 are hardened and ground from a special fabric of steel, they passing clear through, with grease cups G1 and G2 at the top, and castellated nuts N3 and N4 at the bottom. The tie rod T1 is straight and protected by the section of the axle not only against "hog backs" in the road, but from a direct frontal attack. Attention is also called to the perches P3 and P4 for the springs, and the reinforcing R1 and R2 inside of the perches, also the tapering T1 and T2 of the I-section plan between the perches and the knuckle pin. In the elevation of this axle the drop comes somewhat abruptly just inside of the perches, but the section S1 and S2 is adequately reinforced at these points, and advantage is derived by thus shaping this member, taking on the form of clearance in the required amount without the disadvantage of raising the center of gravity of the automobile.

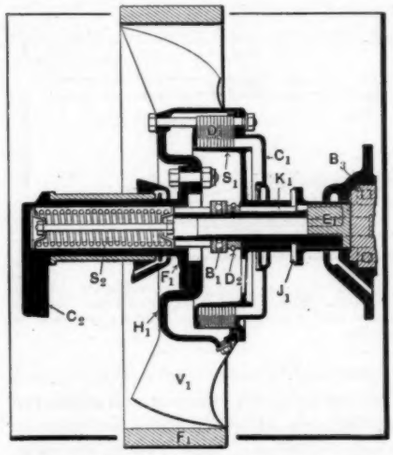


Fig. 4.—Section of the flywheel and the multiple-disc clutch showing the relations of the component members of the same

Transferring attention to the live rear axle as shown in Fig. 8 of a section of the same, it will be seen that the jackshaft J1 is of heat-treated steel of a special shape without any shoulders or sharp variations in diameter, so that the torsional strains, however they may come, may not be concentrated at a point in the section, and the life of the part in service is therefore the more promising. The hub H1 fits on a taper T1 of the jackshaft J1, and the hub nut N1 is designed to pull the hub up on the taper, and the nut is prevented from backing off by a cotter pin engaging the flanks of castellations in the nut. The Hyatt roller bearing H2 is of special nickel steel with the inner race pressed onto the axle tube T1 and the outer race fitted into the hub bringing the bearing in the plane of the wheel. The brakedrum B1 serves as the inner flange and the holding bolts H3 serve the dual purpose of clamping the spokes and holding the brakedrum in place. The details of the brakes are fittingly illustrated in this section, and in addition to tightness against dust and other accumulations, through the use of the spider S1, grease cups G1 are placed to lubricate the pin, and the excesses of grease that are squeezed out due to pressure on the cups prevent the inward migration of the silt of the road, thus deferring wear and making for silent performance.

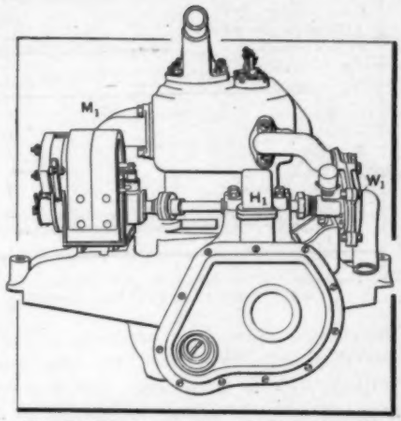


Fig. 5.—Front end view of the motor, showing the lateral drive for the magneto and the water pump from a spiral gear in a housing taking power from the crankshaft through the half-time train

Fig. 9 shows the three-quarter elliptic spring suspension at the rear of the chassis, and attention is called to the rear cross bar B1 with its integral corner pieces which extend out to support the fastening of the half member of the three-quarter system at the joint J1. The full member on the bottom of the three-quarter elliptic spring system has a long reach to the front terminating in a bracket B2, and grease cups G1 and G2 feed lubricant to the spring eyes, and the pins for the shackles S1 are properly sized and accurately fitted in reamed holes.

The general appearance of the chassis complete is shown in Fig. 10, and with a touring body of the torpedo type the car as it appears to a "prospective" is shown in Fig. 11. Among the remaining matters of interest mention is made of the tire equipment with 34 x 3 1-2 tires all around, the tread being standard and the wheelbase 114 inches. The transmission gear is of the selective type with three speeds and reverse, and ignition is by the Bosch DU4 system. Carburetion includes a Stromberg carbureter, and the gasoline tank holds 18 gallons of gas. The radiator is of the tubular type located on the center line of the front axle.

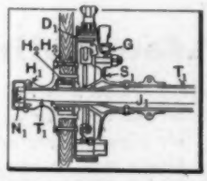


Fig. 8.—Section of the live rear axle through the hub of one of the wheels, showing a jackshaft of changing diameter without flanges or other abrupt contours

Harmony of Scheme Is Depicted Throughout

From what has been said and as a result of a close study of the design, it will be seen that the various agencies for the carrying out of the plan are on a basis of the greatest harmony.

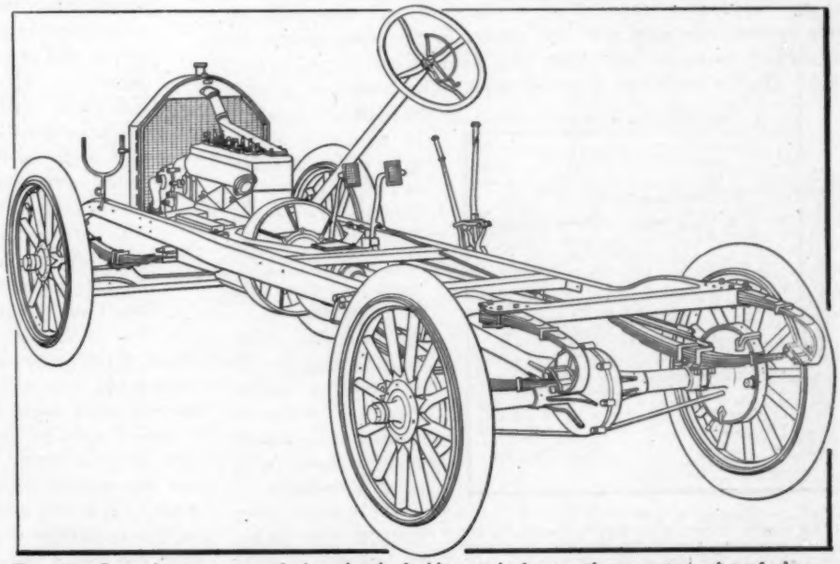


Fig. 10.—General appearance of the chassis, looking at it from a three-quarter point of view.

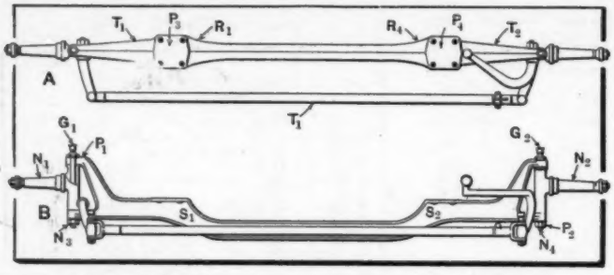


Fig. 7.—Plan and elevation of the Hudson I-section front axle, showing refinements, straight-line designing and strength

The chassis frame, for illustration, is heavier than has been the general practice heretofore, the idea being to afford a stable platform for the machinery. But if a measure of rigidity has been put into the frame it remains to be seen that an equal increment of flexibility is used in the placing of the machinery on the foundation. Accessibility to working parts is also a large factor in this design. Certainly it is of the greatest advantage to be able to get at the functioning members and work upon them if the occasion requires. But this is of secondary importance; if the user of a car is placed in a position to inspect the members of the same the needs from the repair point of view will be reduced to a low ebb. It is the ounce of prevention that saves repair bills and this is the principle that actuates the designer.

Assembling Room Problem

Paying skilled men to lift weights and tug on heavy parts is at a terrific sacrifice of intelligence, and the time is coming in the plants where automobiles are made when the product of brains will be worked and the brawn will be furnished by mechanical equipment of the type that will lift motors and other units off the floor, transporting them to the new location, where they will be lowered down and worked upon at a saving of time, doing away with the type of labor that represents some 90 per cent. of the "personal equation" of which a good impression is difficult to get.

LOWERING the cost of the automobile output of a plant, without putting the mark of Kane on the quality, is the problem that is being worked out in the more progressive institutions, and it is the undertaking that confronts those who prefer to track in the footsteps of leaders, and the question with them has to do with prompt action rather than to prove that the characteristic of the Spaniard as it is represented in that trite saying *"mañana"* is founded on wisdom. In the contriving of shop systems the men who are expert in this line attempt to distinguish between live effort and dead labor. It is a live effort when a machinist working on a lathe completes a part for use in a car; it is a dead effort when a laboring man takes the finished piece and delivers it to the assembling department or elsewhere in the furthering of the main plan, but it is a twice dead effort if a skilled workman who is capable of live effort puts in time on a dead labor basis.

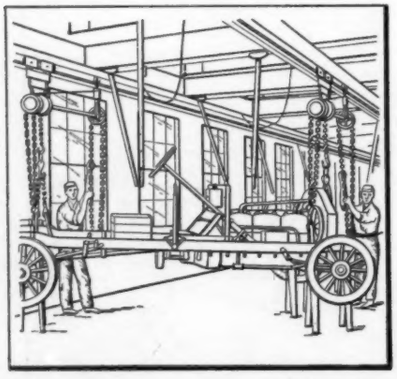


Fig. 1.—Showing a system of Yale & Towne triplex blocks, lifting a complete chassis to permit of removing the horses so that it can be rolled away to the testing department

There are no shop systems now in actual working order that distinguish properly between live effort and dead labor. The systems are made to conform to the apparent necessities, and if the toting of a part from one place to another requires the services of five men, due to the fact that there is no transfer system available such as will supplant the services of these men, the shop-system man promptly concludes that these five men are engaged in a live effort, but such is not the case; they are the official representatives of dead labor.

In the course of time, when the incongruities of the automobile building business are given attention on the part of the far-seeing men who have made the industry what it is; when these keen minds are disentangled from the problems of commercial organization; when the selling of cars is made a routine matter; when advertising is reduced to a standard, and the making of a favorable impression ceases to be an enterprise and falls to the level of a fact, it is then that the dead labor of the plants will be retired and the live effort will be accelerated, all of which is a mere matter of calling a spade a spade, coupled with the installation of suitable hoisting and transferring machinery whereby a hundred dollars worth of this machinery will do quicker and better work than the five men who cost at least $4,000 in salaries for each year that they are engaged, and remembering, too, that the overhead cost must include perhaps 100 per cent. on the cost of the labor, it may be seen at a glance that there is a masterly opportunity lying in wait for the big man in the plant.

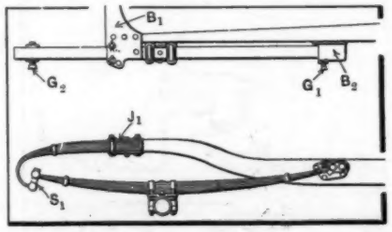


Fig. 9—Scheme of rear suspension of the Hudson chassis, using three-quarter elliptic springs with a long reach and secure methods of fastening

Pending the coming of the discriminating eye that can tell the difference between a live effort and dead labor there is room for the man who will take the time to study the situations, and there is hope, too, that he will arise to the occasion and make for himself a name among the big men of which there are now so few that they are overworked and have not the time to do these things. But in order that we may appreciate the enormity of this situation let us take the following example:

Difference Between Live Effort and Dead Labor

Raw material used in a car	$400
10 per cent. for handling and storage	40
Skilled labor required in the machining and manipulation of this material in the making of a car.	400
100 per cent. to be added to this item against "overhead"	400
Dead labor used instead of proper facilities in the toting and lifting of the material during the various stages of the production process	400
100 per cent. to be added to the cost of dead labor in the fixing of this pro rata of the total of the "overhead"	400

Taking these items as they total up to $2,040 it will be seen that the $400 for dead labor and a like amount in the fixing of the "overhead," making $800, is the amount that should be operated on as dead labor, and for every man in this category whose services can be dispensed with the double of the salary represented may be wiped off the dead account, and who knows, the live labor might be reduced to a more productive level were it waited upon by machines instead of by man. If it takes five men to lift a motor, that is to say, four men on the "beef" end and one man to tell them how to do it, the salaries represented must include the cost of four "huskies" and one set of brains. In the meantime a young man of no great capability, with a keen eye and a measure of vim, can do the work of the four

"beefs" and the one set of brains better than it can be done in the other way. If this is true, it is self-evident that the skilled operators at the machines will be waited upon with greater precision and the work that they will turn out as a direct result will be better, since they will not be annoyed by the vicissitudes involved in the personal equation, and the time that they will have for the doing of work will reflect favorably in the total of the finished product, and so it may be said there is room for the little man who wants to be big, if he will study this problem and learn to distinguish between live effort and dead labor, and the shop system that follows in the path of this study will reflect the truth instead of relating so many things that are not so.

In some of the well-equipped shops and in the assembling and other departments triplex blocks, as shown in Figs. 1 and 2, are doing efficacious work, and in many cases these systems of "overhead" tracks are worked out, including trunk and feeder lines, so that the materials as they come from the storehouse at one end are routed from machine to machine and from department to department, landing in the assembling place almost without feeling the sullying touch of the hand of dead labor. These equipments are inexpensive in view of the work they do, and they are so substantially designed and constructed that they stand the brunt of rigorous effort with but slight depreciation in the course of years.

PLAIN LANGUAGE FOREIGN TO MOST WRITERS—Seemingingly it is as difficult to get writers to use plain English as it is to get automobilists to read—both types of citizens are missing an excellent opportunity. In one example a writer refers to curves as describing orientation. As an example of the type of automobilist who should change his way, contemplate the owner of a high-priced car who said: "What do I want to read for—ain't I got a chauffeur?"

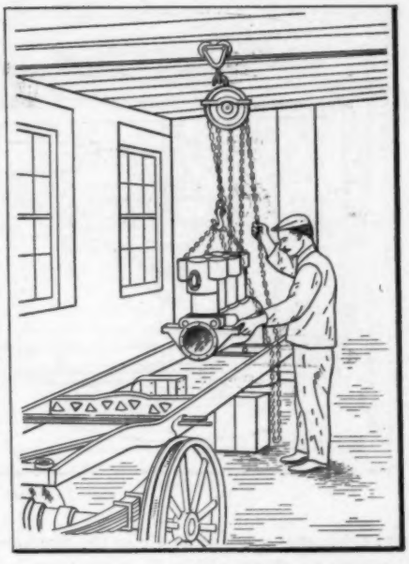


Fig. 2.—Showing a Yale & Towne triplex block suspending a motor over a chassis with one man lowering the latter into place

1912 Lozier in Perspective

Looking at the Car with the Purchaser's Eye

Illustrating the six-cylinder type of ball-bearing motor and the chassis to match. Presenting one model of the finished product to satisfy the eye of the artistically inclined. Centering on the mechanical work involved in the construction of the cars for the purpose of bringing out the worth in the settled plans of this establishment. The investigation shows that there was but little of effort required in the refinement of the 1912 *model over its* 1911 *prototype.*

SUCCESS in the building of automobiles is the child of stability of thought and persistence along well-defined lines, and the greatest measure of success comes by adhering to a school of design and satisfying the details of a definite plan. Quite a number of users of automobiles have expressed the hope that they might some day get a composite type of automobile that would hold in its maw the accentuated ideas that are ordinarily known as selling points, as they reside in all of the makes of cars, bereft of the relatively plebeian

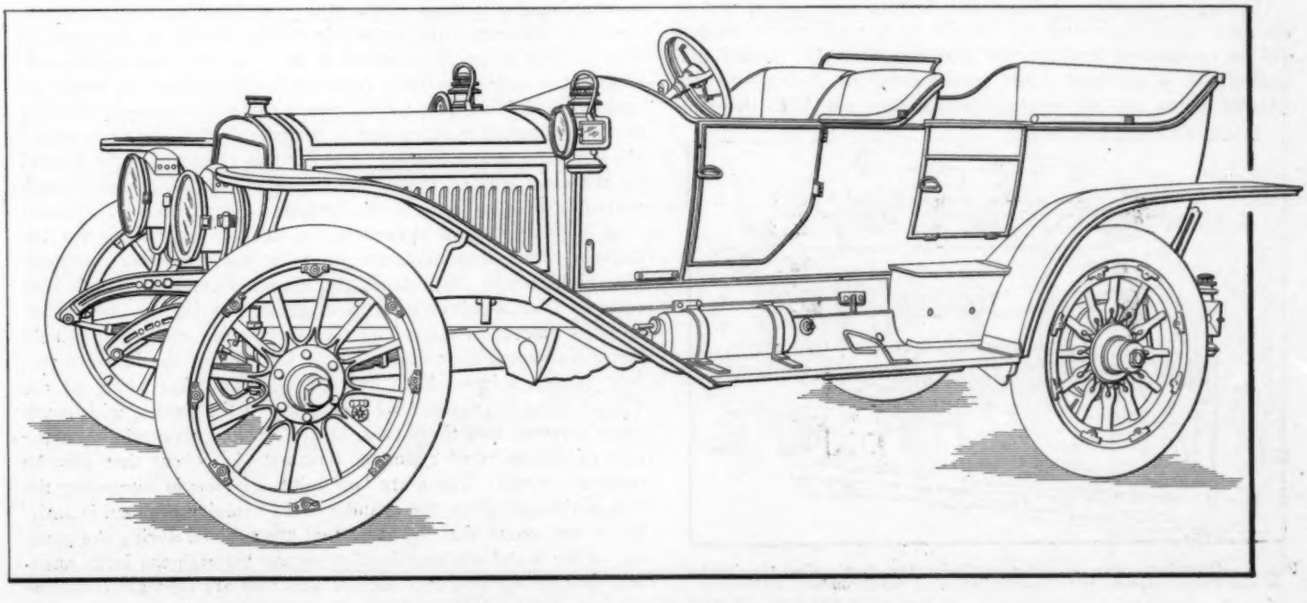


Fig. 1.—Lozier four-passenger shaft-drive Lakewood torpedo model

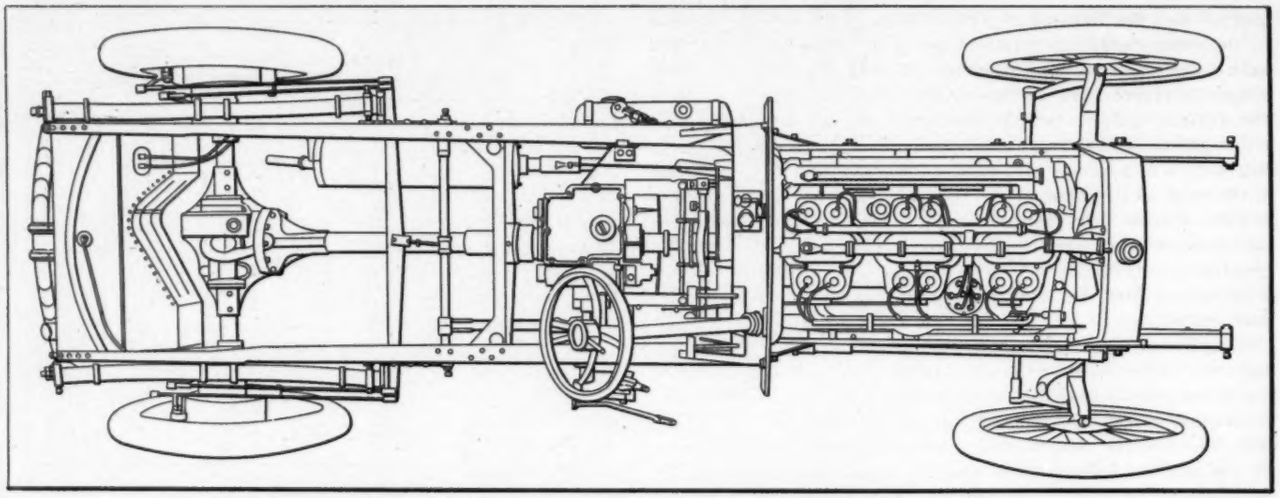


Fig. 2.—Plan of the Lozier six-cylinder model, showing the relations of the units

thoughts that seem to nestle in the machinery, rather because they have to be there, although to the men who take this view they wore their welcome out long ago.

In the Lozier car of the subject it is the expression of a distinctive school of design, and the evolution that has been going on under the impetus of persistence has produced refinement of product rather than startling innovation. The 1912 Lozier "Six," under the circumstances, is the replica of the previous effort, and the things that have been done were more in the nature of processing than of change, thus bringing about a better set of conditions, not only in the manufacture of the car, but in the service department as well, resulting in the ability of the Lozier Motor Company in its new plant at Detroit, Mich., to construct a definite number of automobiles up to a predetermined standard, and to place them at the disposal of users with proper assurance to them that their investment will be conserved.

Fig. 1 exemplifies the finished product, this particular model of torpedo work being known as the "Lakewood." In the marketing of the car the prospective is afforded a number of options in body types, and a plurality of color schemes, among which mention is made of automobile blue, maroon-wine, moss-green, golden-brown and Brewster-green. The types of bodies include a touring car of the fore-door design, the Lakewood torpedo as shown, the well-known Briarcliff model and the Lozier limousine.

The impracticability of imparting definite information and at the same time discussing the details of a plurality of models will be recognized, and for the purposes here the further discussion will be confined to the precise detail of the type 51 six-cylinder motor, and the mechanism that goes with it in the completion of the chassis as shown in Fig. 2, of a plan view, and Fig. 3, looking at the underside. Referring to Fig. 2, it will be seen that the motor of the six-cylinder type, with the cylinders cast in pairs, rests on the chassis frame, with its radiator centered over the front axle. The transmission gear is a separate unit placed amidship. The live rear axle, floating on platform springs with a long reach of the side members, is related to the transmission gear through a stout torsion tube surrounding the propeller shaft, terminating in a large ball and socket, secured to a cross-bar back of the transmission gear. Gasoline is carried in a commodious tank supported on the underside of the chassis frame, and the tank is nested around the enlargement of the live rear axle, being suitably contoured for clearance. Having arrived at a good general impression of the layout of the units in the chassis, to discuss the units in detail will be the logical thing to do.

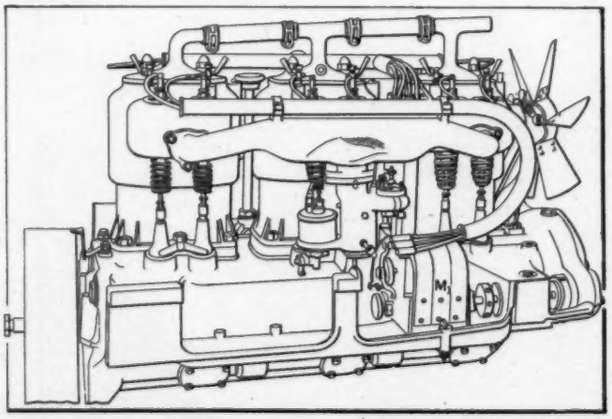


Fig. 4.—Right-hand side of the six-cylinder motor, showing the location of the Bosch magneto and the installation of the Stromberg carbureter

Design and Construction of the Six-Cylinder Motor

Referring to Fig. 4 of the motor, showing the right-hand side, the magneto M1 is placed back of the front arm, taking its drive through a flexible joint from the shaft that extends out of the half-time case with a bearing in the front arm of the motor. The pad on which the magneto rests is formed in the integral pan that flanges out from the motor, tying in between the arms, serving as a protector, doing away with a sod apron. The utility of shaping the casting of the motor in this way will be appreciated by looking at the underside of the chassis as presented in Fig. 3. The magneto as placed is in a perfectly accessible position, but it may be quickly removed for inspection or repair by undoing a holding bolt which passes through a boss in the rim of the pan, which holding bolt is designed with a head not unlike the head of a railroad spike. The Stromberg carbureter is located on the same side of the motor in the mid-position, and is supported by holding bolts in the flanging of the neck of the manifold, the latter being shaped in the light of experience for the delivery of an equal measure of gas to the respective cylinders. The high-tension leads from the magneto enter a conduit that curls up from a point above the magneto, clearing the intake connections, taking its fastening in a pair of dead eyes that are held through integral connections on the top side of the intake manifold at two points. Each pair of cylinders, they being of the T-head type, is provided with caps above the valves, with spark plugs screwed into these caps, and the water connections on the tops of the pairs of cylinders terminate in covers that may be removed at will. There are two points of view in discussing the shapes that are given the cylinders; the foundry problem is satisfied to the extent that the gases that are evolved during the pouring of the metal are permitted to escape through the large openings that are formed over the surfaces that are ultimately covered

by the water connections, and in service, should a crust accumulate over the exterior of the dome of a cylinder, these covers may be removed and the surfaces may then be cleaned so that spheroidal action may be prevented.

Referring to Fig. 5 of the left-hand side of the motor, the water pump W1 occupies a similar position to that of the magneto on the opposite side, and its drive is contrived identically with the magneto, offering the additional facility of a pulley for the fan belt between the front arm and the half-time gearcase. The belt is wide of face, and the fan is fastened in place by a bracket; it rotates on ball bearings, and a means of adjustment for maintaining tightness of the belt is located in an accessible position. The water pump is of the centrifugal type, is fitted with a commodious stuffing box to prevent leakage, and a large-sized grease cup is screwed into a boss on the stuffing box, the idea being to lubricate the bearing and keep the stuffing from cutting the shaft. The oil pump O1 is located just back of the middle arm, taking its drive from a lateral shaft through a spiral gear, one mate of which is on the camshaft. The breathers B1 and B2 terminate in a trumpet-shaped casting, and foreign matter is prevented from passing into the crankcase through the breather orifices by a fine-mesh screen located in the trumpets. The water piping is of copper of excellent workmanship, and the connection from the pump to the distributor pipe curves up, terminating centrally in the distributor, the idea being to compel the flow of an equal measure of water to each of the respective cylinders. Attention is called to water drain cocks at the low point in the suction of the pump, and throughout the design care has been taken to provide a means for getting rid of water, thus preventing accidents in cold weather, and permitting of the removal of worn-out anti-freeze solutions as the occasion requires. The exhaust manifold is clearly depicted above the water connections. The manifold is held in place by three yokes, so that in the removal of the same it is done by backing off three castellated nuts, with cotter pins as the locking means.

It was said that the oil pump was driven from a spiral gear on the camshaft. Fig. 6 shows the camshaft with the spiral gear referred to in the position G2. The camshaft is driven through the halftime gear G1 and it floats on annular type ball bearings B1, B2, B3 and B4. The shaft is of excellent diameter, and the cams of hardened alloy steel are of substantial design. This particular camshaft belongs in the type 46 four-cylinder motor, but it is presented here as sufficient to indicate the general plan, attention being called to the use of annular type ball bearings in this work. The motors being of the T-head type, two camshafts are used. Fig. 7 shows the ball bearing crankshaft construction as used in the Model 46 motor, with annular type ball bearings B1, B2 and B3 taking the load. The difference between this

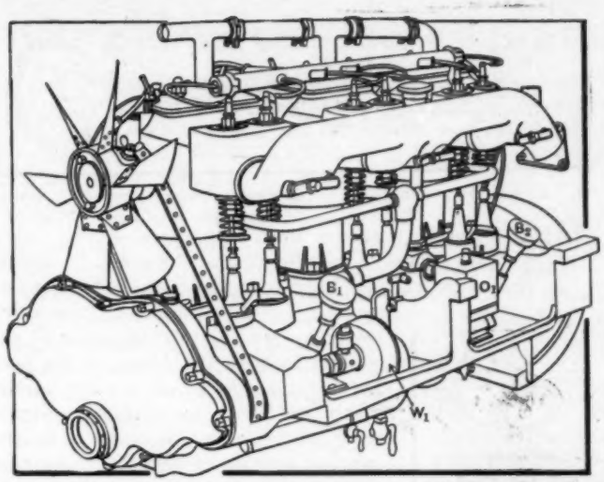


Fig. 5.—Left-hand side of the six-cylinder motor, depicting the position of the water pump and the automatic oiler

crankshaft and the same type as used in all of the Lozier models is a matter of detail. Fig. 8 shows the half-time gears, the cover having been removed for the purpose.

Multiple-Disc Clutch Interprets the Power of the Motor

The partly assembled multiple-disc clutch is shown in Fig. 9 with a nest of discs G1 on the spider, and the master plate M1 partly removed, with the clutch spring S1 concentric with the hub of the master plate. The clutch is in an oil-tight house within the flywheel, occupying substantially the whole of the space therein, presenting a "flush" appearance from the exterior, and the method of arranging the clutch pedal motion with interconnections with the shifting lever is shown in Fig. 10. For the purpose of facilitating the disassembling of the clutch an accommodation joint U1 is used, and the details of this joint are shown in Fig. 11, in which the shell S1 is taken away, disclosing a gear U1 on the end of the shaft as it protrudes out of the transmision gearcase, and the mating internal gear U2 is also presented. In the makeup of this accommodation joint attention has been paid to the necessity of affording a measure of universal action and the chances of generating noise have been thwarted by doing good work, and as Fig. 11 indicates, when the shell S1 is removed and the internal gear U2 is taken away, a gain in clearance longitudinally is established, the amount of which is sufficient to permit of the unbolting and removal of the clutch so that if it gums the owner may pull the clutch out of its house and clean it.

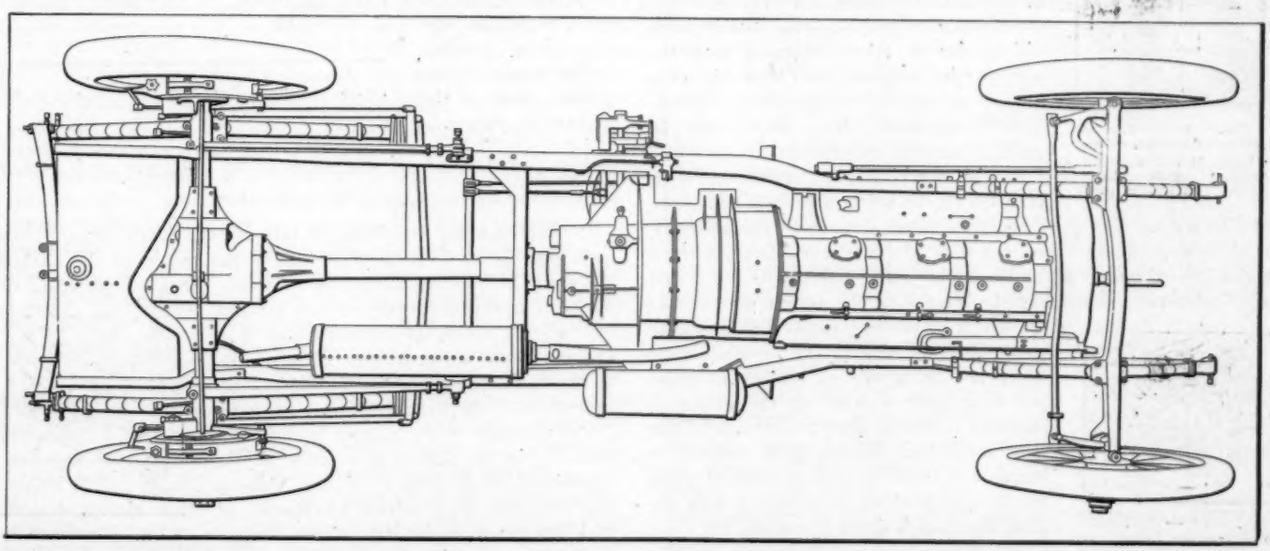


Fig. 3.—Underplan of the Lozier six-cylinder model, showing the protective measures taken and the elimination of a sod apron

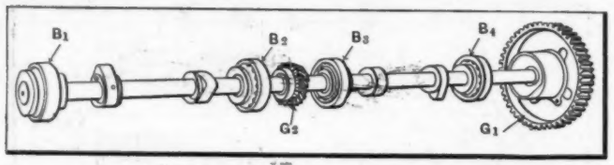


Fig. 6.—Camshaft construction, showing annular type ball bearings

Among the nice details in the working out of the control system mention is made of the location of the pedals P1 and P2 in Fig. 12, and the use of a ball bearing B1 in the housing of the steering column. Moreover, the workmanship attending the fashioning of this housing includes the fitting of the parts and a bell-shaped cover so that foreign matter and water are excluded. Fig. 13 shows the steering wheel with a knurled grip and flutings on the inner rim around the periphery between the arms of the spider fashioned to accommodate the fingers of the two hands, thus giving the driver a good grip. Fig. 13a shows the worm and worm wheel of the steering gear, and the thrust ball bearings that are used to take the thrust of the worm.

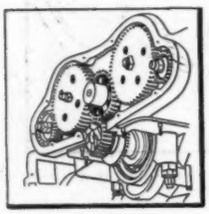


Fig. 8. — Half-time gears in a tight case with the cover removed to show the plan of nesting

When the teeth of the wheel show service all that has to be done is to rotate the wheel around far enough to bring a new set of teeth into mesh with the worm.

Selective Sliding Gear Has Four Forward Speeds and Reverse

The general design of the selective type of sliding gear is shown in Fig. 14 with the universal joint pinion U1 in view at the front of the case, and attention is called to the extension of the case under the universal joint to meet the extension of the motor case with a flange and a means of bolting whereby the continuity of the under protection is maintained as indicated in Fig. 3. The cover of the transmission gearcase is held on by a system of bolting with wing nuts W, the idea being to permit of the quick removal of the cover and to gain complete access to the cavity within, so that worn-out grease may be completely and readily removed, it being the contention of the designer that the average automobilist, if he is confronted by a troublesome undertaking, will prefer to take a chance with the life of the automobile. If it is only desired to inspect the gearbox, a handhole is provided whose cover may be quickly removed or replaced.

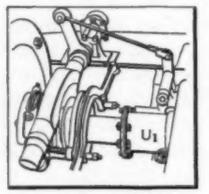


Fig. 10.—Nesting of the clutch yoke universal joint and relating members

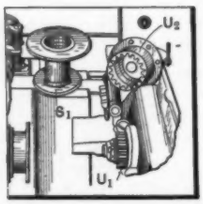


Fig. 11.—Universal joint between the clutch and the transmission gear taken down to show the parts

In the working of this transmission gear system all shifts are made by means of one lever. The third speed is direct drive, and the standard gear ratio on direct drive is 3 to 1. In actual practice the third speed is used nearly all of the time. The flexibility of the motor and its power, considering the weight of the automobile, enable the driver to run on the third (high) gear under a great variety of road conditions, and at speeds as low as 10 miles per hour and as high as the motor is capable of driving the car, in view of the road condition. Should it be desired to travel fast, over a long stretch of good roads, with nothing to interfere with the plan, the fourth speed is thrown in.

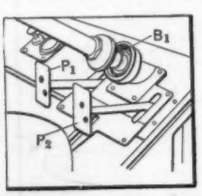


Fig. 12. — Footboard and pedals, also the support for the column

The differential gear is nested with the bevel drive in the live rear axle as shown in Fig. 15, and the bevel pinion P1 is supported by two ball bearings, thus doing away with an overhang. The bevel gear G1 meshes accurately with the pinion, and an adjustment is provided at A1 whereby conditions for noiseless performance are established. The differential set is of the bevel type with a spherical housing, with circular holes cut in the housing permitting access to the gears D1 and helping in the lubricating problem. Fig. 16 is a perspective of the assembled live rear axle showing the brake levers L1, L2, L3 and L4 and the hand adjustment A1 for the brakes, and Fig. 17 shows one of the set of brakes in greater detail, with a lever L1 to constrict the bands on the drum and a limit stop L2 to prevent dragging, with a hand adjustment A1 in an accessible position. Attention is called to the use of grease cups G1, G2, etc., which cups are provided at every point of vantage. In addition to the hand adjustment A1 for the bands an adjustment is also provided as shown in Fig. 18 for the brake rod, the shaft being supported on the post P1, and the lever L1 is held by a clamp G1 in addition to a key, with a quick adjustment A1 whereby the length of the rod may be changed to suit the condition.

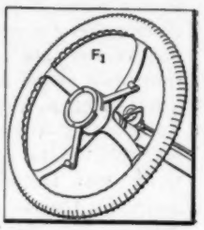


Fig. 13. — Steering post with flutes and corrugations to give a good grip

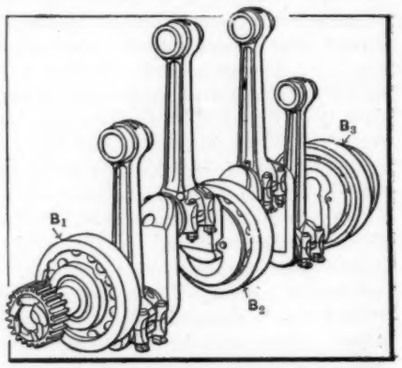


Fig. 7.—Crankshaft construction showing the use of annular type ball bearings

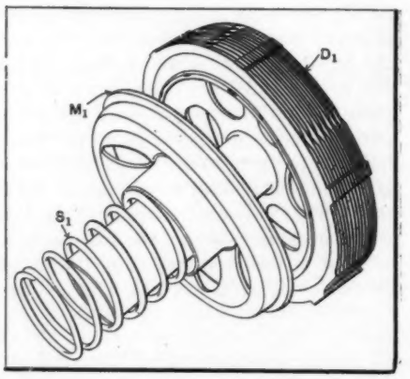


Fig. 9.—Multiple-disc clutch disassembled with the master plate backed off

Fig. 19 shows equalizers for the brakes, and the distance rods B1 in the horizontal position. The equalizer arms are of pressed steel and the arm B1 rests above the arm B2, taking bearing in the section of the chassis frame in the manner as shown.

Many Evidences of Excellence in Design and Detail Throughout

In following up the design details of the power plant it has been entirely to the neglect of the workmanship of the chassis, but space forbids the furtherance of this effort, excepting to indicate that the evolution of this product has brought about the harmony that is in keeping with an ambitious effort. Fig. 20 shows the shackling S1 of the platform springs, and the nesting of the gas tank T1 at the rear of the chassis, and a tight filler C1 in an accessible position at the right-hand side (rear) of the chassis. Fig. 21 shows an auxiliary lubricating oil tank bracketed to the side of the chassis, and a filler F1 with a tight cover, also a

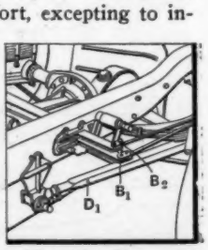


Fig. 19.—Shows the equalizer system for the brakes

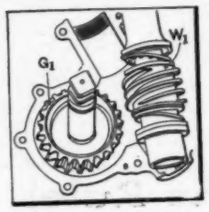


Fig. 13A. — Worm and gear of the steering system

pump P1 for use in lifting the oil out of the tank into the circulating system.

The Model 51 motor has cylinders 4 5-8 x 5 1-2 with the valves on opposite sides, and the A. L. A. M. rating of the motor is 51 horsepower. Ignition is by double-stem high-tension Bosch magneto, with a storage battery auxiliary. Lubrication is by splash with an automatic oiler. The wheels are fitted with 36 x 4-inch front and 36 x 5-inch rear tires. The tread is 56 inches and the wheelbase is 131 inches and other details to match.

Oil-Burning Explosive Engines in Germany

The great demand for small explosive engines consuming gasoline, which has been especially noteworthy during the last few years, naturally has directed the minds of nearly all enterprising builders to the possibility of producing a somewhat similar engine which would operate successfully with cheap crude oil as a combustible.

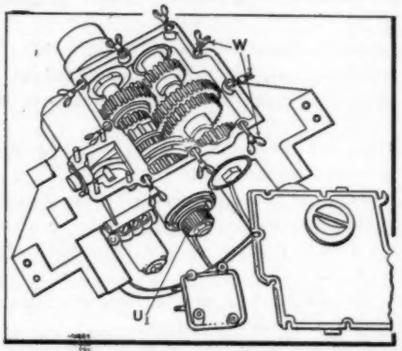


Fig. 14.—Four-speed transmission gear arranged for direct drive on third speed

It is now understood that motors of this kind of from 5 to 30 horsepower have been perfected and are likely to be introduced commercially within the next few months, having already been exhibited at the Brussels Exposition.

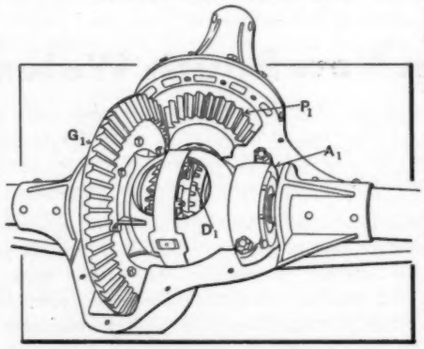


Fig. 15.—Bevel drive and differential unit with the cover off showing an adjustable ball bearing

The average cost of operating a 10-horsepower motor 10 hours with crude oil in Germany is 30 to 50 cents, theoretically, whereas the same power with gasoline would cost from $1.50 to $2.50. This is a big reduction on the cost of using gasoline. However, fuel economy is not the only advantage claimed for the new engine. The danger of handling crude oil is very much less than that involved in handling gasoline and the storage of the fuel is much simpler.

These small motors will have neither carbureters nor lighters nor magnetos. The liquid fuel is exploded in the cylinder by the introduction of a jet of compressed air of a certain temperature. It is claimed that the consumption is perfect, that the starting is automatic, and that there are no brusque variations of pressure while the engine is in operation.

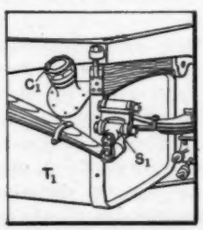


Fig. 20.—Shows the platform spring shackles and the nesting of the gasoline tank

It is to be hoped that American manufacturers who are experimenting along these lines will be ready soon to propose an engine of the class described, for which there is a popular demand not only in Germany but particularly in Russia, where crude oil is being utilized at the present time much more generally for motive power than it is in the United States.

Rubber in the Malay States

The increasing demand for rubber has resulted in great activity in Malaysia, which is admirably suited for its production. To save the high charges of the London market the growers have organized a rubber exchange of their own, with headquarters in Singapore.

THERE is wonderful activity in the rubber plantation industry all over the Malay States. Large areas of jungle lands are being cleared for plantation rubber growing. The forests, very dense, are being subjected to the same heroic treatment as is the case in Ceylon and British Guiana, where trees are being planted and cultivated. The dense forests are being felled and the underbrush is burned away. Some of the men who realize the rapidly growing demand for paper argue that the wild rubber trees that are being cut down to make way for the planatation industry might be converted into pulp, instead of letting it go to waste. Everywhere in the Southeast part of India interest in the new industry is taking on a marvelous impetus. Coolies are in great demand. The planters in the Malays claim that 15,000 coolies are needed to tap and collect the latex of 4,000,000 trees. The planters are beginning to wonder where they will be able to get a sufficient number of coolies from when the rubber trees of the Malay Peninsula shall have increased to 45,000,000 in number. They are already casting eyes upon China in anticipation of the need of more coolies.

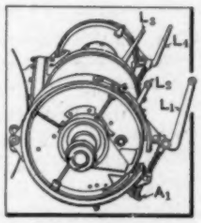


Fig. 16.—Perspective of the live rear axle unit

There is much to be done before the rubber is ready to ship from the Malays to London—the charge for which amounts to about $17 per ton. There is the sorting process, work which requires great care, on account of the various prices that attach to the various grades of rubber; mixed lots selling at a reduction over lots that have been sorted after a system. The thin, transparent sheets and crepes of rubber are most in demand in the market. After the rubber is put into cases—which are made in Japan of white wood—it is weighed, a full case containing about 110 pounds. It is then carried to the transportation companies for shipment to London.

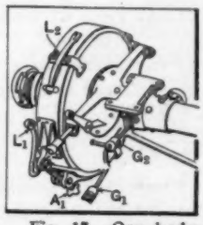


Fig. 17.—One brake-drum system showing the hand adjustment

The high charges of the London rubber market have had the effect of inducing the plantation-rubber cultivators and buyers of the Malay States to organize a rubber exchange in Singapore. This in order that they may avail themselves of the opportunity to purchase raw rubber direct at the place of production. They argue that with this plan in operation they will be able to operate against the London brokers and extend the rubber market. The planters declare that up to the present time they have been absolutely at the mercy of the brokers and that for this reason they wish to have the business transacted near to the base of supply. Singapore, being the center of the rubber-producing belt, offers every advantage as a place of sale.

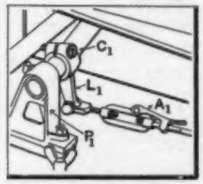


Fig. 18.—Quick adjustment in the brake rod

One firm in Singapore handles $5,000,000 worth of raw rubber annually. A member of the firm is authority for the statement that by establishing an exchange a large portion of the para rubber output of the plantations would be marketed there including Borneo, Malaysia, Sumatra and Java, and for the reason that the planter would be able to obtain the best prices.

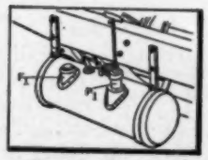


Fig. 21.—Presents the auxiliary oil tank and pump

It Stands to Reason—

(Remembering That the Exception Proves the Rule)

THAT segregation is a process that is going on all the time bringing good ideas to the surface, and dropping the heavy weight of impracticable thoughts to the bottom of the tank.

THAT a safety valve is a good thing on a man as well as on a boiler.

THAT a thermometer is a good device for measuring temperature, but it fails to keep the man who is getting the worst of it from showing his spleen—"whom the Gods would destroy they first make mad."

THAT a ship without a rudder is in no worse fix than a man without shackles for his ugly temper.

THAT the right name for some of the second-hand automobiles that were described as in running order is hard to figure out, nor could it be sent through the mail.

THAT the sacred oath of a salesman is no better than the car that he gets rid of.

THAT a sanguine person resides in a house with a leaky roof.

THAT the "sauce" to apply to an uncertain situation is to tighten up the purse-strings.

THAT cloth of gold belongs on the back of the fellow with the long head.

THAT keenness of vision may come too late; keen intellect is more to the point.

THAT salvation responds to a simple formula, but the buyer with a trusting nature is lucky if he has a speaking acquaintance with it.

THAT the difference between a savage and the aborigines who offered to buy used cars from owners is the bare thickness of a piece of tissue paper.

THAT an "Irish stew" differs but slightly from a noisy gear box.

THAT there are as many varieties of noise in some rear axles as there are of meat in boarding-house hash.

THAT fish, flesh and fowl is all right in a turtle, but it is a terrible combination in an automobile.

THAT an idea clad in the gown of truth, if it is masquerading, is a difficult situation for a trusting man to encounter.

THAT a glossary of words descriptive of automobiles that failed to satisfy would reduce to lean proportions were users inclined to make up their minds to what they really require before making a purchase.

THAT it is a prodigious error to rely upon a boulevard demonstration as sufficient evidence of the sweet-running qualities of a car.

THAT eternal vigilance is sound asleep when a man without a family selects a seven-passenger tonneau, but eternal vigilance awakens with a start when the neighbors discover that such an excellent means of pleasure is next to their very own.

THAT the man who looks into the pedigree of his office boy before taking him on is the type of person who will pay $5,000 for an automobile without looking at it.

THAT the speed of electricity may be 187,000 miles per second, but it balks at a bad joint in the wiring of the ignition system.

THAT it is an evil thought that enables a good citizen to view a bad road with equanimity if only it is located in front of his neighbor's door.

THAT the solution of a problem is a very interesting pastime, but the owner of an automobile is in poor business trying to amuse himself in this way.

THAT forty days of rain constituted the original deluge, although some automobilists have been able to acquire one in less time than that.

THAT the soft trembling voice of an angelic type of motor is never heard in the region of an abused automobile.

THAT an armor-piercing projectile would have trouble getting through the hide of some of the men who deal in second-hand cars.

THAT some of the most advanced ideas live in a poor neighborhood.

THAT from better to worse is the direction of the tire bill if a state of partial inflation is satisfactory to the chauffeur.

THAT the pursuit of happiness suggests the use of a power tire pump.

THAT the polished surfaces of the cylinder walls will lose their luster if they are etched by chemicals.

THAT it is a flight of fancy that takes a man with money into a place where they sell junk accessories.

THAT the insolence of a defective spark plug is indicated by the grunts of the motor.

THAT stiffness in the demeanor of a motor suggests the absence of suitable grades of lubricating oil.

THAT ripe experience is generally at the cost of at least two automobiles.

Market in New South Wales

Twenty per cent. of the automobiles now in use in that section of Australia are of American manufacture. In order to insure an increase of business there our exporters must observe certain well-defined rules peculiar to the country.

THE New South Wales section of Australia is manifesting not only a remarkable interest in the automobile, but the popularity of the machine is "getting" everybody. The official statistics just issued give the number of automobiles registered in Sydney as 2,100, these representing about 164 different manufacturers. Enumerated by their respective countries, the makers include 870 British; 752 French; 402 American; 123 Italian, and 102 Belgian. There are certain rules to be observed in going out after this trade of the Oriental brother. In addition to the price that is asked for the complete car, each invoice is required to set out a statement, naming the country of origin, and the prices charged for chassis, body, footboards, mudguards, tires and lamps, when sold separately in the country in which they were manufactured.

LEARN TO DRIVE BACKWARD—Among other things connected with driving which is apt to be neglected is reversing or driving a car backward. Usually a car is never reversed for more than a few yards at a time and the maneuvering involved requires no great skill. Steering a car when running backward is diametrically opposite to that when running forward. A turn of the wheel to the left steers the car in the opposite direction to the right, and vice versa. The usual mistake made in reversing is in turning the steering wheel too far and describing zigzags in the road as a result. The autoist should remember that the reverse gear of a sliding change gear should never be engaged until the car has been brought to a full stop.

Natural Wood Finish

Modern Trend in Elegant Body Work

In connection with the latest fashions in automobile trimming, various natural wood-finished beading strips and borders are being employed. Naturally, the finish applied on these woods as a means of developing the most exquisite effects is a subject of interest to the automobile owner and user no less than to the automobile manufacturer. Mahogany is the wood chiefly used, probably because no other wood offers the luxurious effect, when well finished, that this rare and beautiful timber displays. Central and South American mahogany, under many alluring titles derived, in the main, from localities in which the timber grew, is principally used in automobile work.—M. C. Hillick.

PRODUCING the soft, pleasing lights and shadows, and the witchery of color effects, characteristic of mahogany when deftly treated, is a prime consideration. General directions are employed, chief among which is the cleaning and preparation of the wood for the filler. This is, in fact, the principal feature of work. The wood should be worked down with sandpaper to an absolutely clean condition. Water or other spots on the wood, if developed prior to filling and shellacking, will ruin the appearance of the wood, and all these things should be guarded against. In the event of water spots or stains showing on the wood before the filler goes on they should be thoroughly sandpapered out.

Mahogany is an open-grained wood to the extent that it requires a good paste filler composed, preferably, of a mineral base. Mahogany filler may, of course, be bought ready mixed for use, but many critical finishers, and, for that matter, automobile owners, prefer the shop-mixed pigments for the reason that certain shades to suit individual tastes may be brought out.

A mineral filler has the advantage of being practically indestructible. That is to say, its texture does not shrink; neither does it discolor with age. After choosing the base of the filler—speaking now of the shop-mixed product—proceed to mix it in practically equal parts of raw linseed oil, coach japan and turpentine. Mix the filler first in the oil, then add the japan, and stir in the turpentine until a brushing consistency is reached. Apply the filler to the surface freely with a bristle brush and permit the coat to dry up until it takes on a dead appearance due to the evaporation of its natural gloss. Then proceed to immediately wipe the filler across the grain of the wood, using for this purpose a tuft of clean, soft waste or tow, the latter being the better of the two. Always insist upon having the grain of the wood completely filled, otherwise, despite your best-laid plans, the finish will prove defective. After wiping off the surface clean and nice stand aside until the following day, at which time, at reasonable intervals, apply a couple of thin coats of orange shellac.

Allowing forty-eight hours, or, better still, seventy-two hours, for the material to dry apply two coats of very pale rubbing varnish, lightly sandpapering the first coat. Should it be decided to make the finish in a polished surface rub the second coat of varnish with water and pumice stone flour to deaden it perfectly and apply a coat of straight polishing varnish. When this coat has dried thoroughly rub it with water and pumice stone flour, then with rotten stone and crude oil; next saturate a tuft of soft fabric with some good varnish polish and proceed to work hard and firm on the surface until a high polish is wrought. Varnish is polished only through the medium of friction, a fact worth bearing in mind. First-class wood finishers usually finish the work of polishing by using the palm of the hand held firm and worked briskly in circular motions until the friction thus created develops that deep, high brilliancy which is alone the sure mark of the surface brought up to the perfectly polished state. After the full polish is secured moisten a wisp of white cotton waste with denatured alcohol and pausing until evaporation has left but a slight vapor, proceed to "spirit off" the polished surface. This will clear up any appearance of cloudiness and fetch out the high, sharp brilliancy of the finish. The advantage of the polished surface for automobile interior parts finished in the natural wood is that the surface does not easily mar or disfigure or show finger marks or other evidences of handling.

In the department of wood finishing cherry is classed as a close-grained wood and needs no filling. Sycamore, quarter sawed, is a wood of much beauty and while comparatively close-grained, finishes up best over a good filling. Beech, quarter sawed, likewise if nicely stained yields a fine appearance. This wood requires no filling. Red beech, stained in various shades, can be made to produce clever imitations of more expensive woods such as, for example, mahogany, walnut, cherry, etc. Birch and maple are close-grained woods and require no filling, but brought up to a natural wood rubbed finish produce beautiful effects. Maple, of all the woods, probably under the effects of staining furnishes the richest sorts of mahogany and cherry effects. Red wood, while passing as a close-grained wood, should be filled.

Staining the wood of the body is a line of work the automobile finisher should be thoroughly familiar with, and for obvious reasons the automobile owner and user had best know something of the whys and wherefores of the work. Staining serves as a means of enhancing and teasing into greater prominence the beauty of the wood. Stains are employed for this purpose and additionally for the purpose, as occasion requires, of producing an aged wood effect. Moreover, by the use of stains certain tones and shadings may be developed in the wood which are essential to harmonize with the trimming materials.

There are two kinds of stains recognized as desirable in the best class of natural wood finish, viz.: acid and oil stains. The acid stains are principally used over hard woods. Such stains enrich and emphasize the natural beauty of the wood. Owing to their excessive penetrating quality they go deep into the wood and thereby develop original wood effects. Fairly remarkable double-toned effects are possible by the use of acid stains and paste wood filler.

In using acid stains proceed, before applying the acid, to sponge off the wood with cold water, and when the wood dries, sandpaper thoroughly, thus reducing the raised grain.

Oil stains are, by virtue of their lack of penetrating qualities, best suited to use over soft woods. They are easily applied and afford splendid contrasts in color lights and shades.

A final word anent either staining or filling is this: Develop so far as possible all the beautiful effects of which the wood is capable, after which in orderly sequence bring forth a finish by the aid of shellac and varnish that will please and satisfy the universal demand for something unique and handsome in connection with the automobile.

Testing Automobiles in the Tropics

In the Straits Settlements recently a series of trials were held to determine the relative merits of various cars, especially with a view of overcoming the tendency to overheating in the high temperatures prevalent there throughout the year, and of testing the ability of the various woods used in their construction to withstand the extreme moisture.

PORTIONS of the Straits Settlements, within convenient distance from Singapore, have been the scene of a number of lively trials of automobiles, the tests having just ended. The object was to find out how the machines would behave in the tropics. There are so few roads there, except those through which bullock carts have blazed the winding, tortuous way, that people looked askance when it was proposed to send automobiles into the rough, undeveloped country, hundreds of miles of which is virgin. A severe trial was mapped out for the motor cars, one of the greatest difficulties to overcome being that of overheating. To this end it was decided to subject radiators, waterjackets, cylinders and pistons to an extremely high hydraulic pressure. To begin with, fiber-gear wheels were strictly forbidden. The experts selected to make the tests insisted upon it that a special tropical water circulation should be devised, by means of which the water, after having undergone a test of full speed, should not show a temperature higher than 100 degees Fahrenheit above atmospheric temperature in the shade; also that any wood used in the making of the automobile should be competent to endure extreme tropic moisture and heat; again, that the car must show a willingness to start easily on a grade, and, finally, that a full motor car should be capable of stopping on a grade of one in seven, and that it should be held stationary with one brake.

Fig. 2—The folding of a top in such a way as to break the bows and ruin the fabric of which it is made

Poor Tops Spoil Good Cars

Many Examples of Inferior Work to Be Seen

Presenting illustrations of wretchedly fitted tops on otherwise good automobiles, showing also the poor taste that seems to obtain among automobilists, especially in view of the fact that the greatest offenders were of the class who rely upon chauffeurs to do their work. Much of the fault is due to failure to instruct the chauffeurs to earn their stipend.

STANDING on the corner of Fifth avenue and Forty-second street, New York, and counting the automobiles as they go by, offers the advantage of a clear insight into the ramifications of mechanical transportation, affording some food for serious reflection, not without indicating that there is a screw or two loose in the makeup of the broad idea. Of twenty cars fitted with cape tops that went by within less than one-half hour, but two of them were of the right color to match the motif of the body and glove fitting. Eleven of the tops looked very much like examples as here illustrated, and, unfortunately, some of them appeared on automobiles that cost upward of $4,000. In one case a car that could not be purchased for much less than $5,000 was sporting a top that would be high priced at $40.

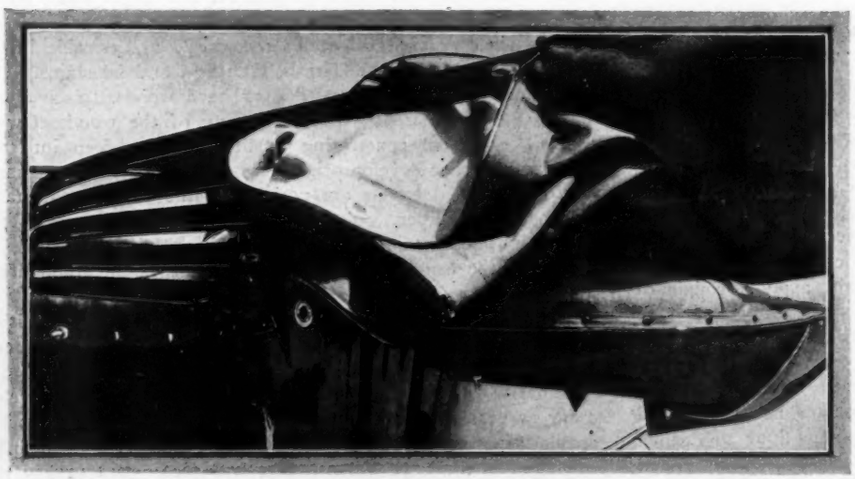


Fig. 1—Showing a top that might have been good at the start, but lack of care has made its mark

The practice of having the tops put on after the automobile is delivered by the maker seems to be at the bottom of the unfortunate efforts that mar the good appearance of the automobiles, and the question arises as to whether or not the makers of automobiles can afford to sanction the vogue of a wretched top on the products of which they have so much to say for the quality that they are supposed to represent. In the meantime, the users of automobiles can help the situation to a very great extent, first, by declining to

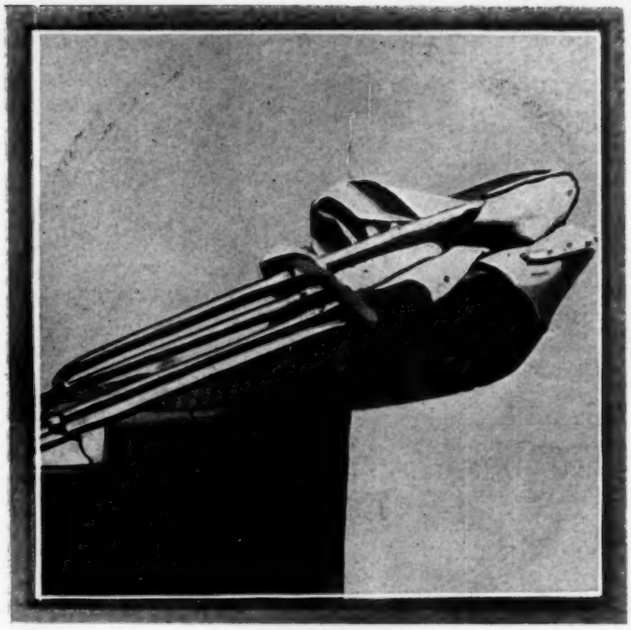


Fig. 3—Caught in the act—how a chauffeur was trying to show his incompetence

accept poorly fitted tops, and, second, by properly folding them down when they are not doing the work for which they are designed. Even some of the best fitting tops are ill-provided to keep out accumulations of road dust during the time that they are folded down.

Caring for the Top

Some hints concerning the preservation of the automobile top which will prove of value to the owner in that they will, if followed, not alone save him money, but make for the continued good appearance of his car.

AS an important feature of proper car equipment, the automobile top is deserving of a degree of attention commensurate with its relative value as a factor in automobile service. It is an expensive part of the car, and it is exposed to a particularly harsh form of service.

It is crushed together, and in this position made to serve as a receiver of highway dust and dirt, and during storms its extended surface is mercilessly assailed by the elements, so that, on the whole, unless given exceptional care and fortified with some preservative material designed to strengthen and enlarge its capacity for service, the days of its usefulness are destined to be few.

The top is often looked upon as a bad-weather friend and during the fine weather is reckoned more of a nuisance than an ornament. Be that as it may, the top needs care if any length of service is to be had from it. A careful driver puts his top up every night, and after a wetting always leaves it up until it is dry. It is difficult to remove dust from mohair with a brush if it has had time to embed itself, as it eats into the rubber through the somewhat large weaves of the hair. Cotton, having a finer weave, holds the dust superficially and lends itself to easier treatment with the brush. Gasoline should never be used for removing stains from a top or renewing for the color; it eats the rubber away and causes the two layers of fabric to gape and become no longer waterproof.

The directions for caring for the top are, in the main, simple and not many. Clean as often as possible of mud, road dust, and dirt accumulations of every sort, all of which are injurious to the leather, rubber or other fabric composing the top. In case these accumulations have taken hold of the surface of the top so that a light dusting will not suffice to remove the matter, whip a bit of castile soap in some clean, tepid water to make a froth of suds, and wetting up a soft sponge in the water, go over the top until thoroughly cleaned.

Never let this dirt and fetid matter remain long upon the top. Such substances destroy the enamel of the leather or rubber and this gone it is a short shift to decay for the top. After sponging off the top always dry it off with a wash leather.

With leather and rubber tops upon which the enamel remains intact and vigorous, this bathing in water, smoothed out with a spray of castile soap, as often as the top becomes foul with the filth of the road, will to no mean extent prolong the wear of the fabric.

For the rubber top with a worn, broken and fractured enamel, showing a generally service-stricken surface, a dressing of real worth may be prepared as follows: Liquid asphaltum, one part; unrefined castor oil, three parts. Confine in a close vessel and agitate until a complete unity of the ingredients is secured. Should the dressing lack a sufficiency of black, add a bit of drop black cut with turpentine to a paint consistency. This will also do for the leather top. The castor oil renders the rubber or leather soft and flexible and neutralizes the tendency of the asphaltum to become brittle.

A good formula for renovating a black rubber or leather top from which the enamel has largely disappeared consists of liquid asphaltum, 1-8 gallon; outside finishing varnish, 1-4 gallon; boiled linseed oil, 1-8 gallon; castor oil, 1-16 gallon; coach japan, 1-8 gallon; ivory drop black, 3-4 pound. Mix these ingredients thoroughly together in a closed vessel to permit active shaking. After agitating the contents sharply for a time, add refined or pure turpentine in a quantity sufficient to bring the mass to a good brushing consistency.

A formula including beeswax is made of asphaltum, liquid form, 1-8 gallon; outside finishing varnish, 1-8 gallon; beeswax, 1 ounce; castor oil. 1-8 gallon. Bring to an intense black by the addition of a little drop black. Mix thoroughly and thin out to a brushing consistency with turpentine.

For a straight leather top with a worn and travel-stained appearance, but sustaining no fractures in its enamel, the following mixture will serve a good turn: Neatsfoot oil, 1-4 gallon; beef suet, 3 ounces; melted beeswax, 1 tablespoonful. Melt the oil and suet together, after which add the beeswax. Confine in an

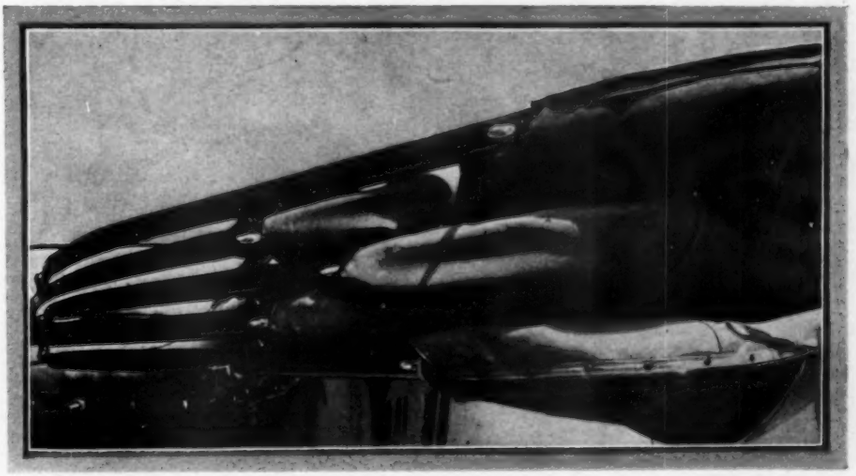


Fig. 4—A well-made top that was ruined in a few months by careless handling

air-tight vessel, agitating same until a complete mixture of the contents is secured. Apply sparingly with a soft cloth and follow up with a clean piece of woolen, wiping clean and dry.

By way of information, it may be stated that all of the above dressings should be applied thinly and worked out smooth and uniform. With the exception of the last formula, all the materials should be brushed on, using for the work a flat bristle brush of soft joint and of a No. 1 quality.

For tops other than rubber or leather the use of tepid water and castile soap mixture is recommended, applied with a soft, sheep's wool sponge, wiped dry with a wash leather, and then given an application of some good transparent renovator to render the fabric soft and pliable and fortify it against the ravages of service.

In case such renovators are not at hand the mixture of oil, suet and beeswax, already referred to, wiped on with a soft fabric of some kind and dried off carefully with a clean wad of woolen, will do very nicely. This dressing and the ready prepared renovators are particularly adapted for use upon the rubber-covered cloth top finished in a dull brown effect, and known to the trade as vulcanized carriage cloth.

The lining of the automobile top should also be cared for diligently. It needs frequent brushing with a whisk broom to flick out the dust and enliven the nap of the goods. These are small matters in themselves, but they prolong the life of the top.

The boot is the covering that encloses the top when folded, protecting it from the inroads of dust and mud which is invariably thrown up by the wheels, leaving a cake on either side. This can be obviated by the use of specially shaped mudguards, but the low curved type is not favored owing to the obstruction it causes during tire-changing operations. The reason that a material with a leather appearance is better for this purpose is that it is easier to clean with a sponge and water and has a firmer hold on the top material, preventing it from chafing. The cause of this is that the material is in constant friction at the same points of contact for a long time, in spite of any precaution that one may take to keep the bows separated from one another. Present-day practice is to fit separators between the bows to prevent rubbing, but they cannot be large enough to prevent a certain amount, otherwise they would be unsightly. Straps are used to keep the bows from jumping as the car travels over inequalities on the road; these answer, in a fair degree. Something more rigid, though, in the shape of a metal clamp, is far better; of these the market affords a choice.

When imitation leathers show signs of wear and begin to lose their luster a top dressing will greatly improve them. Such dressings should possess as little oil and varnish as possible, as the oil deteriorates the coating and eats it away, while the varnish, although giving a momentary luster, increases the hardness and renders the material more liable to crack. The moment the outside layer of auto leathers crack there is no longer any substance to ward off the rain, and the waterproof effect is broken down. Turpentine is sometimes used in the manufacture of dressings and its presence can be detected by the smell. This cuts into the leather compound and has much the same effect as oil, except that it is more intense and swifter in its effects.

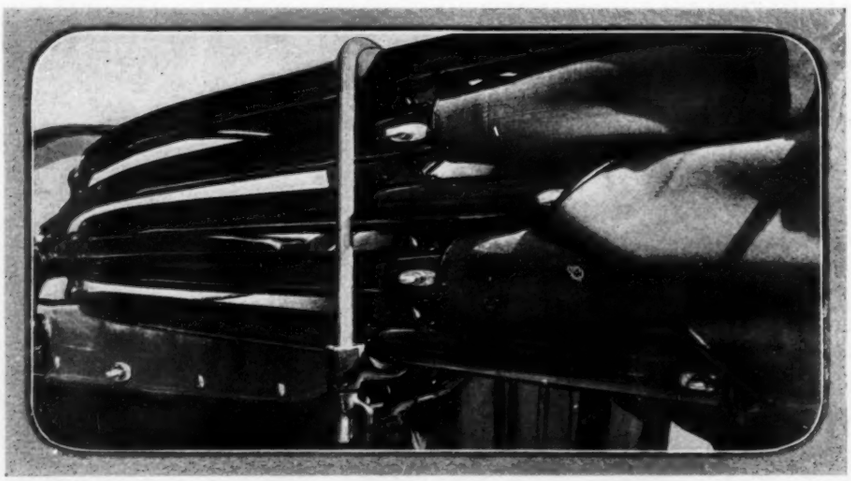


Fig. 5—Well-made top, provided with a fastening device that looked formidable, but the chauffeur was indifferent

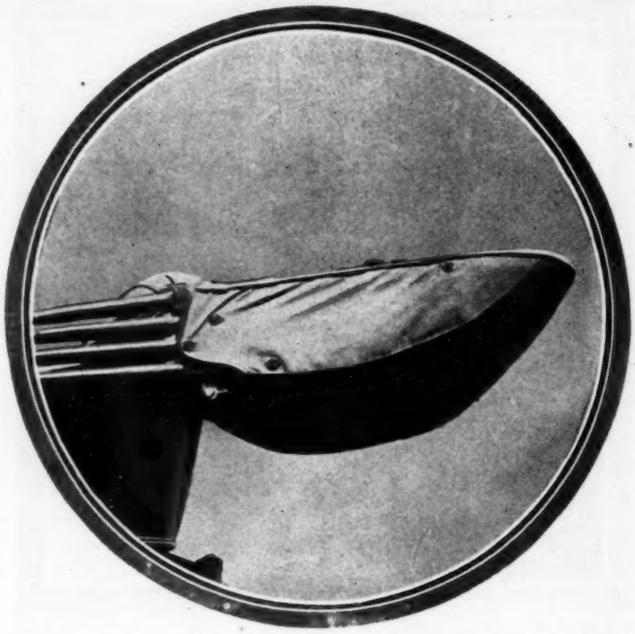


Fig. 6—A fright—the bag that was used as a cover was merely a caché for dust and other foreign matter

Getting Rid of Moths

Sun, wind and weather are not the only enemies of automobile upholstery; the lowly moth levies a constant toll in this direction unless some means are devised to circumvent it. Some of the most efficacious methods of blocking the path of the little pest are here set forth.

THE most destructive object to automobile trimmings is the moth, and as the principal materials used in vehicle trimming are cloth, carpet and hair, which are all food for the larvæ of moth worms, it becomes a question how we can best protect ourselves against this destructive little insect. Probably all other destruction combined wrought upon trimmings does not equal that of the moth, says *The Carriage Monthly*. The wear of cloth by use causes it to become threadbare, dust and dirt and grease sometimes cause it to become unsightly, but the material is still intact; but when this destructive pest starts its work it leaves the goods in holes and sometimes actually falling to pieces.

The "clothes" moth is a delicate little creature and, unlike many other moths (of which there are a number of species), is very active on the wing, and when caught and crushed there seems to be scarcely anything left but a little dust. But it is not this flying moth that causes the destruction to cloth and hair, but the havoc is caused by the larva,

Fig. 7—The star top from the point of view of unsightliness—in other respects the automobile was a good one

which is the worm or caterpillar hatched from the egg of the moth. The moth, indeed, goes through a wonderful transformation.

The fly is seen on the wing especially at night, as its habits are nocturnal. They are capable of access to the most secure places; they can gain access through the smallest crack and crevice and deposit their eggs between the folds of cloth. After hatching it is when the destruction begins, as the voracious little larva (caterpillar), when yet but the size of a pin's point, begins to devour the expensive material and grows rapidly until it attains its full size, when the larva forms a kind of cocoon spun by its salivary glands, which change into spinning glands. This cocoon protects the pupa or chrysalis while undergoing its change into the perfect state. The chrysalis is formed by the skin of the larva and allows the pupa to lie within it to protect it from ordinary pressure until it again comes out and flies around.

The best way to protect material is by destroying the eggs, which is best done by giving a gentle brushing. As we have said, the larvæ go immediately to destroying as soon as hatched, and observation has shown that they prefer dusty or soiled cloth in preference to new, as frequently old cloth is found devoured, especially at greasy places.

There are many remedies for moths, such as camphor, tobacco and a great many patent remedies, but in all cases where any such remedy is used great care should be taken not to injure or soil the face of delicate shades of cloth. such as drabs, etc.

How to Renovate Leather Cushions—The cleaning and treatment of the leather cushions in a car is a very simple operation. A weak acid may be used to clean off foreign matter, following which the leather should have a very thorough cleansing with warm water to remove every possible trace of the acid. The leather is then softened with castor oil, or, better, neatsfoot oil, which may be obtained from any dealer in leather, or from nearly all paint stores. It is a good idea to have this oil around and apply it at all times, for it makes the leather softer, more pliable, and much better-looking.

Beautifying and Preserving the Finish

Avoiding the Disorders That Make a Dull Car

M. C. Hillick offers to the automobilist a line of information in relation to finish of bodies that has to do with the problems of adornment, with special reference to the maintenance of a high standard of appearance at a minimum of cost, and the tricks of the trade are laid bare to the man who might otherwise overlook the fact that luster, as it is concealed in varnish, accompanied by delicate pigment, will die if it is not fed on light, and maintained under conditions of good ventilation, preventing it from breathing in the poisonous vapors that abound in dark and stagnant places.

AT the outset let's make the matter plain by saying that varnish is the most universally used and the least understood material known. Good varnish is something that brightens and beautifies the automobile surface, keeps it clean and cleanable, protects it, prolongs its life and renders it useful, and gives to the buyer value received.

Varnish on the automobile is subject to the hardest wear it ever has to encounter. The varnish that will wear for eight or nine months, or, at most, a year on the automobile may be classed as an exceedingly good varnish. You may as you pay your painter for varnishing your car indirectly pay at the rate of from $5 to $7 a gallon for the varnish used, but if it fulfills the

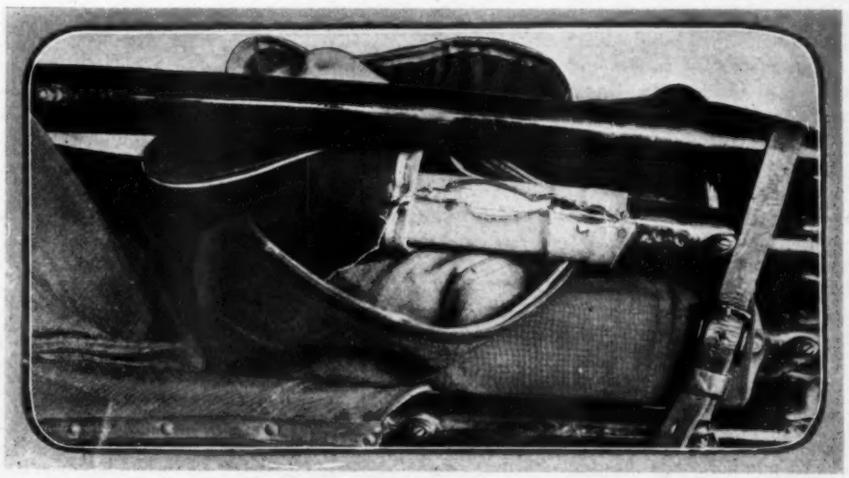


Fig. 8—Held down by a stout leathern strap—otherwise the top would respond to the demand of the wind and become a balloon

mission above described it is well worth the money paid for it.

Urge the painter to use the *best* varnish upon the car, for, after all, in the final analysis the varnish is one of the important things which contribute directly to the value of the car and makes it good to look at when not a few other details fail to satisfy.

In connection with the life of varnish upon the automobile there are some characteristics which the general public ought to be familiar with.

First of all, varnish should dry without "tack"; that is to say, without stickiness. The varnish that, after it goes into service, offers an adhesive surface—sticky or "tacky," as the technical man expresses it—catches dust and dirt, and photographs finger marks with unerring accuracy. Such a varnish is a cantankerous material and however scrumptious it may look at the beginning it quickly dons a villainous appearance and swiftly goes from bad to worse. The vital point in this matter, from the vantage ground of the automobile owner is to stipulate in his contract with the painter that the varnish *must* dry without tackiness.

Varnish not infrequently shows a disposition to blur and display dirt streaks; or it may "bloom," or, in plainer terms, show a cloudy, blue plum appearance. There are, in a word, two reasons for this, to wit: the possession of substitute ingredients or an inferior surface beneath the varnish. These, however, should not be confounded with the temporary cloudy look that spreads over even the finest varnish in wet, moist weather, and which readily disappears under a gentle flow of clean water and a light "flossing" over with a soft, lint-free wash leather.

A costly, and, in the main, a perfect varnish, occasionally deadens shortly after getting into the thick of service. Soft, immature undercoats, and porous ones, suck the oil out of varnish, in which impoverished condition it loses its life look and succumbs to the drain upon its vitality.

The spotting of varnish upon the automobile is due principally to mud accumulating and drying upon the surface. This mud in drying exerts a capillary attraction upon the surface through the medium of which the oil of the varnish is extracted resulting in flat, lustreless patches. Mud spotting is the most malignant type of surface disease and when the mud is permitted time to act to anywhere near the extent of its capacity there is no remedy other than letting the varnish dry, rubbing it over with water and pumice stone flour, and revarnishing.

In case the spotting has not progressed sufficiently the original brilliancy of the surface may be restored, at least temporarily, by first rubbing the affected places with equal parts of raw linseed oil, turpentine and denatured alcohol, following immediately with a soft piece of blotting paper used with circular motions as a polishing medium. Soapy or dirty water will cause almost any varnish to spot. A high-grade automobile varnish containing a large percentage of oil is especially susceptible to the effects of the potash and acid contained in soapy or dirty water. At once upon the manifestation of this variety of spotting the surface should be washed with clean, soft water.

As a matter of fact, a thorough bath under a good flow of soft, clean water is the best "first aid" treatment known. If at the end of a day's run the varnish could be washed thoroughly with clean, cold water the spotting trouble would be reduced to the minimum.

Indeed, the varnish kept clean and slick through frequent washing—granting, of course, that the washing is skillfully done—will remain immune to many diseases and deviltries, and give a form of service to please everybody concerned. What the automobile owner wants and should have on the surface of his car is a varnish that looks every inch its royal breeding through all stages of wear until old age finally blots it out.

Abbreviated Injunctions

DON'T feed the intellect on a litany that begins with the word "second"; it is the prefix to the designation of a car that is conspicuous for its absence in the "Red Book.'

DON'T rely too much upon a guarantee; it is a condition of sale, but it may have a rickety power plant.

DON'T listen to the creaky spokes in your automobile; take the hub cap off and douse the wood with linseed oil.

DON'T expedite the effort of the dealer if he is merely trying to detach you from your funds without giving you very much in return.

DON'T rely upon the eventual for the good running qualities of your automobile; a profit will be derived from the overhauling of the car in front of the touring season.

DON'T listen to the swan song of the man who would tell you that good gasoline is getting scarce; authority is responsible for the statement that of the total supply of gasoline the automobile uses but a small measure.

DON'T let the demonstrating clerk use 76-degrees Baumé gasoline in the car that you are to buy if it is true that you will have to use 56-degrees Baumé gasoline in regular service.

DON'T give the carbureter credit for being able to work satisfactorily to-day on 76-degree Baumé gasoline, with the idea that it will perform equally well to-morrow on 56-degree Baumé gasoline—there is a difference between a carbureter and a juggler.

DON'T worry about the future of the gasoline supply—Mother Earth never yet went back on her inhabitants.

DON'T start out with the joyous inspiration of a newly-wed if you have selected an automobile with a "Katzenjammer" gear box.

DON'T do your reputation the serious injury that naturally accompanies the thoughtless purchasing of tires.

DON'T waste pity on the inhabitants of an almshouse and be content with tire "seconds" for your trouble.

DON'T abuse your good sense; the repair man will do that for you.

DON'T feel instinctively the exquisite quality of the runabout that the salesman is describing; just let him give you a sample of real performance.

DON'T admit the ownership of a mechanical fallacy; you can get a good automobile in the next block.

DON'T be loath to participate in a pointed discussion of the prime facts involved in the purchase of an automobile; when the demonstrator exaggerates, plug up your ears.

DON'T occupy the position of "comic supplement" to the salesman who is trying to make you buy a car that will not be good for your work; just tell him that he is barking up the wrong tree.

DON'T fail to be polite, but when the salesman indicates that he cannot understand your need, just tell him that the insignificant being that he is talking about shall not belong to you.

DON'T be "fresh"; the salesman might get mad and sell you a car that will take all of the freshness out of you.

DON'T let the second-hand man "tickle you most to death" with the latest good story, and in his absent-minded way let you have a car.

DON'T be side-tracked by the fellow who would cry in your lap; if you know what you want, get it; if you don't know, keep your money in the bank until you find out.

DON'T indulge in a "modern madness"; even a good automobile will wear out too soon if you make it go pell mell on a rough road.

DON'T tear yourself away from a day with classic literature and in the interim take a fancy to an automobile "classic."

DON'T commission a deputy to act for you in the matter of the purchase of a car; it is an admission that he has more brains than you are supposed to possess.

DON'T take so many free demonstrations that you will lose your judgment; it is better to confine your investigation to the types of automobiles that are likely to serve your purpose.

DON'T be an extremist in the matter of accessories; use the same good judgment that you display when you pick out a tailor.

DON'T be the vermiform appendage of a second-hand emporium; appendages get troublesome, due to the pestering influence of bad contents.

Peeps Thro' Goggles at Distant Lands

What the Foreigners Are Doing in Automobiling

The United States Government, through its Consular Service, has facilities for gathering all sorts of trade information. Many interesting items concerning the automobile and allied industries in foreign countries, along with the opportunities for trade extension as they arise, are set forth.

NOT long ago, a law was passed in Prince Edward Island, providing that any person guilty of operating a motor-car upon any highway, "or in any other public place on the Island," should, "upon summary conviction" be fined $500; or, in default of payment, undergo the humiliation of languishing in jail for a period of six months. There were some people upon the Island, however, who, regarding the law as being rather stringent, attempted to have it repealed. But the session of Parliament which has just ended resulted in a refusal to interfere with the statute. Vehicles of all sorts if operated by any other than muscular power—except steam rollers and railway trains—are tabooed. Therefore, automobilists are shut out of this beautiful land of fish and foliage.

On the first day of May, the automobile regulations which the International Convention of Switzerland prescribed on the 11th of October last, and which the Swiss Federal Council unanimously ratified in December of that year, went into effect in every part of Switzerland. A provision of the regulations is that every automobile owner residing in Switzerland, whether native or foreign, shall provide himself with what is known as an "International Route Certificate." Besides the regular numbered plate which is attached to the rear of the motor car, there must also be another plate with the initials "C. H.," meaning Confederatio Helvetica. Thus far, Switzerland, Sweden, Russia, Holland, Monaco, Austria-Hungary and Germany have agreed to abide by the regulations as prescribed by the Convention. Upon making application in Switzerland, one receives a certificate from the authorized Cantonal official. This certificate contains the owner's full name and place of residence; the kind of automobile or motorcycle which he operates; the manufacturer's name and the series number of that particular model of car; the weight of the machine in kilos; the form and color of the machine; the number of cylinders; and the power in horsepower. In addition, the registry-number must be entered on the plates of identity; a photograph of the chauffeurs employed (not more than two may be hired by one owner of a car) must be affixed to the certificate; and full information as to the chauffeurs' names, dates and places of birth and their permanent residence must be given.

The certificates in question are provided by the Cantonal authorities upon receipt of satisfactory information being received from owners of automobiles. But the certificate does not by any means cancel the owner's liability to the conventional customs duty regulations.

To distinguish the country in which the machine was made, an oval white plate 11 4-5 by 7 1-4 inches, must be procured, the letters on which must be black, and 10 centimeters long by 15 centimeters wide. Here are the distinctive letters which stand for the respective countries named: United States, U. S.; Austria, A.; Great Britain, G. B.; Germany, D.; Belgium, B.; Hungary, H.; France, F; Spain, E; Sweden, S.; Switzerland, C. H.; Servia, S. B.; Russia, R.; Montenegro, M. N.

Afghanistan prides herself in being ruled over by one of the most progressive Kings in the Far East, namely, Habib Ullah Khan. He has suddenly shown a disposition to follow in the footsteps of his brother Potentates of Continental Europe, and to this end he has just been laying in a new stock of European-made automobiles—something like a dozen in number. He also insists upon employing an English chauffeur. The King may be seen almost any day being driven about his domains like mad, for he insists upon riding like the wind. But it is not everywhere that he can be driven, for the reason that some of the roads in His Majesty's little kingdom are almost as bad as the very worst asphalt-paved streets of New York.

The Venezuelan Government on April 4th of the present year decreed that benzine and gasoline should be placed on the first class of the customs tariff. The importation of these commodities into Venezuela is thus made possible, by reason of the reduction of duty by the decree $15 per 2,046 pounds gross weight. Prior to this enactment, the prohibitive price of benzine and gasoline made the use of automobiles practically out of the question.

Even as matters stand, the number of motor cars in this section of South America is very limited. The Minister of Finance is the possessor of a French limousine; there are two public automobiles in commission; and the Venezuelan Government has ordered two more French-made motor cars for the use of officers. In fact, the Government officials have suddenly come to the conclusion that it is time the highways were improved and extended and to this end financial provision has been made for the betterment of those roads which lie in the neighborhood of Lake Valencia and Caracas, in order that automobilists may derive the benefit. This fact will in itself it is believed have the effect of creating a live market for the sale of motor cars. The greatest difficulty lies in getting adequate supplies of gasoline and this is at the bottom of the stagnated spirit of the people with regard to automobiles at the present time. Gasoline may be shipped to Venezuela by lumber and coal-carrying schooners. But in the event of not finding a schooner, shipments may be made to Venezuela by way of Curaçao. In which case, care should be taken to manifest the cargo to Venezuela direct, with instructions to transship at Curaçao only, otherwise, a surtax of 30 per cent. will be imposed, as applies to other merchandise imported from the Antilles into Venezuela.

Buenos Aires has just published municipal statistics, showing that the tax on automobiles in that city is regulated on a sliding scale, from $21.23 to $169.84, the amount depending upon the horsepower. There are 3,524 automobiles in the city at the present writing, the total revenue on which amounts to $194,360, United States gold. There are 222 machines of from one to five-horsepower; 1,000 of six to ten-horsepower; 910 of eleven to fifteen-horsepower; 484 of sixteen to twenty-horsepower; 691 of twenty-one to thirty-horsepower; 147 of thirty-one to forty-horsepower; forty-five of forty-one to fifty-horsepower; and twenty-five of fifty or more horsepower. The people of Argentina look with favor upon the advent of the automobile.

Ecuador's mountains are gridironed with such appalling roads that thus far no dealer has been found with sufficient faith in the outlook to establish an agency in the republic. Even wagons, carts and carriages are practically an unknown quantity here, except in the interior, where some pretense is made to connect the towns by highways. The streets of these towns are but a slight improvement over the country roads.

What Some Subscribers Want to Know

The Editor invites owners and drivers of automobiles who are subscribers to THE AUTOMOBILE to communicate their automobile troubles, stating them briefly, on one side of the paper only, giving as clear a diagnosis as possible in each case, and a sketch, even though it may be rough, for the purpose of aiding the Editor to understand the nature of the difficulty. Each letter will be answered in these columns in the order of its receipt. The name and address of the subscriber must be given, as evidence of good faith.

Flywheel Is Probably Loose at the Flange

Editor THE AUTOMOBILE:

[2,670]—My motor, which is now doing its third year of service, has developed a peculiar but positive knock which I am unable to find. It runs along delivering its accustomed power and operates reasonably well until I slow down by putting on the brakes or when coming to a bad place on the road if the going is unusually heavy this knock appears. I have associated this noise with almost everything in the car, but investigation fails to prove that I have discovered the cause of the trouble. I will greatly appreciate any effort that you might make in my behalf, and I certainly do hope that you will tell me what is the matter.

SEASONED AUTOMOBILIST.

Denver, Col.

A pronounced knock that comes in the motor at the instant that it is being slowed down or, better yet, when the speed changes suddenly, is a good indication of the fact that the flywheel is not securely fastened on the crankshaft. If the flywheel is bolted to a flange on the crankshaft your trouble will probably disappear upon tightening up the nuts of the holding bolts, and referring to Fig. 3, for example, it is recommended that the nuts be castellated, and after the flywheel is fetched up tight that the castellations be used in conjunction with cotter pins, thus holding the nuts in place and preventing a recurrence of your trouble.

Floating Test Has Many Virtues

Editor THE AUTOMOBILE:

[2,671]—Being a person of an inquiring turn of mind, and remembering that gasoline is increasing in cost as time goes on, even considering the fact that anti-friction bearings are in common use in automobiles, I still see that there is an obvious difference in the amount of power required to move the various makes of automobiles, and it occurs to me that there should be some way whereby an automobilist of no great skill might be permitted to ascertain the effect of friction upon the running of his machine, thus enabling him to note from time to time whether or not the machine is improving with age or dying by degrees. Can you suggest some sort of a test that will serve the end?

Philadelphia, Pa. SEMI-SCIENTIFIC.

The draw-bar pull of an automobile is an excellent measure of the power required to propel it, and it would be a simple thing to take a pair of scales and after hitching them to the front of the automobile at a convenient point, perhaps the axle, pull the car along on a level floor and note the pull in pounds on the scales. If this pull changes from time to time it is an indication of the fact that the automobile is running harder or otherwise, depending merely upon the amount of the pull. It would be worth something to pull the car for a certain number of feet in a given time and to observe accuracy in the repetition of the test. Still another way is to make a "floating" test, which may be done by taking the automobile out on a well-kept asphalt pavement and after making a chalk line speed the automobile up to this line, reaching say 30 miles per hour, then cut off the power, and with a stop-watch in hand, find how many feet the car will float before it comes to a standstill. This is an exact measure of the draw-bar pull, and the farther the car will float after the power is cut off, measuring from a given speed, the lower the draw-bar pull will be. If this test is repeated, say once a week, it will afford to the interested investigator a series of reliable indications of the workings of the rotative members, showing whether or not the bearings are free and telling something of the conditions of lubrication.

It would also be worth while to try the brakes under a fixed set of conditions on the same asphaltum pavement, but in this undertaking the idea would be to come up to the chalk line, at say 30 miles per hour, and after applying the brakes note the distance that the automobile will travel before it comes to rest. If the brakes are in good working order and the road condition is substantially the same during each repetition of the test, the distance of the stop should be the same on each occasion.

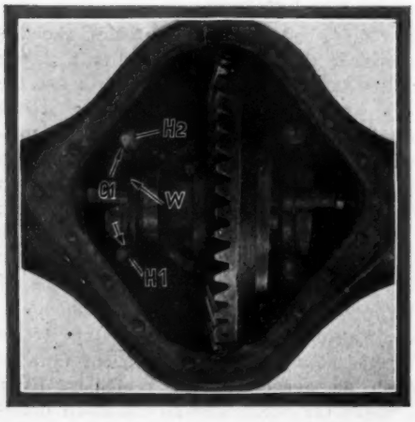


Fig. 1—Looking into the housing of a live rear axle showing the cap screws C_1 used for holding the caps in place, and the locking wire W passing through holes and clinched over at H_1 and H_2, the idea being repeated on the opposite side

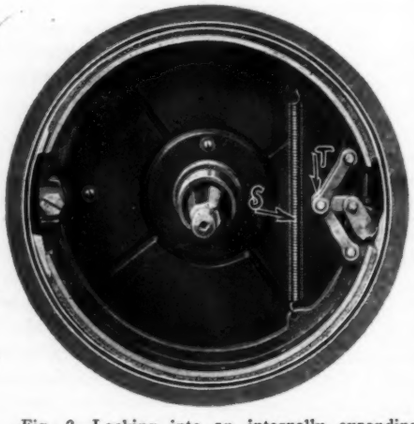


Fig. 2—Looking into an internally expanding brake system showing the toggle motion T and a spring S, the latter being used to prevent the shoes from expanding and dragging, and to stop noise

Too Much Noise in the Live Rear Axle

Editor THE AUTOMOBILE:

[2,672]—Noise is disagreeable to me, and while I do not complain of the dragging of the brake shoes in the drums on the rear wheels on my car, the fact remains that in going over rough roads they seem to strike producing a noise that is frightfully disconcerting. The shoes are of the internal expanding type, and are actuated by means of a toggle with a spring spanning between the shoes to keep them from dragging.

Chicago, Ill. H. A. R.

Fig. 2 illustrates the type of expanding brake as described by you, and the probabilities are that the spring is worn out or the eyes through which the tang of the spring passes are considerably elongated. The remedy lies in the replacement of the spring with a stouter one, but while the opportunity affords it will pay you to examine the pins in the toggle motion and to replace them if they are worn.

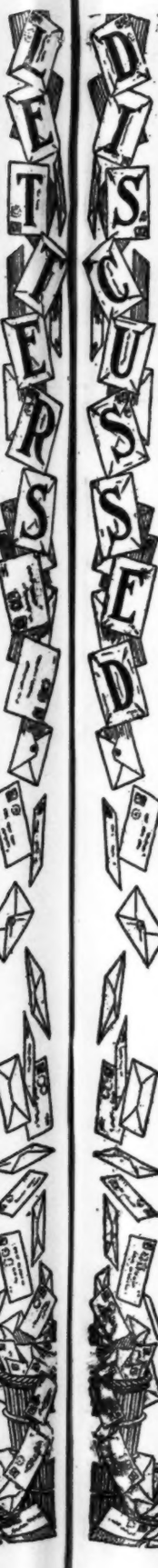
Motor Has Many Idiosyncrasies

Editor THE AUTOMOBILE:

[2,673]—I am having trouble with my E-M-F motor. When the engine is started and runs at slow speed it works very well, but when speeded up one or more cylinders begin to miss and at the same time a spark jumps the air gap on the coil.

The coil and magneto are Splitdorf type and are correctly connected up, spark plugs

What Other Subscribers Have to Say



The Editor invites owners and drivers of automobiles who are subscribers to THE AUTOMOBILE to communicate their personal experiences for publication in these columns for the worthy purpose of aiding brother automobilists who may be in need of just the information that this process will afford. Communications should be brief, on one side of the paper only, and clearly put, including a rough sketch when it is possible to do so, and the name and address of the writer should be given as evidence of good faith.

are clean, magneto is properly timed with gears, there are no "shorts," "opens" or "grounds" (outside of that to magneto) in the system. Sometimes the engine will stop at once when switch is turned to magneto and again, without touching anything, the engine will continue to run when switch is turned to magneto.

Sometimes when started the engine will back fire, even when spark is entirely retarded and it is cranked quickly.

At low speed, when cool, the engine runs well, although it does not pull well when first started off and high gear is thrown in. The machine will be running about 20 miles per hour when of a sudden the cylinders will begin to miss and the progress is so jerky that it seems that a cylinder is firing before it has reached the top of compression stroke. The engine may run for a mile this way and then without a change of spark or throttle it will start off at same speed of 20 miles with all cylinders firing. The engine heats very rapidly and the exhaust pipe gets very hot. The pump seems to circulate properly.

A short time ago I had trouble with the carbureter, but had that adjusted so that the machine ran up to 35 miles per hour, but when the throttle is opened for more than 35 miles the engine began to miss.

Sometimes a cooling spell of half an hour will allow the engine to work well and it may then run from five miles up without trouble.

I have recently cleaned the cylinders with kerosene and a chain so there can be no carbon in them.

Two of the cylinders are timed within two degrees of the marking on the fly-wheel, while the other two are from eight to fifteen degrees out of fly-wheel timing, due to tappets flattening out. I have been informed by automobile men that if tappets are put in so that about 0.005" is the clearance between the tappet and valve the engine will be made quiet running and the several degrees difference this will make in the timing will not make any difference. I know this will make a quieter engine, but won't the change in timing cause loss of power, heating of the exhaust pipe and strain on the crankshaft?

There is on the market a set of valve lift adjusters to keep the space small. Is their use advisable to reduce tappet noise?

Fort Dupont, Del. S. S. RYAN.

Make sure that the valves are ground to a condition of tightness. Replace the valve springs with a set of springs that will demand an exertion of 50 pounds to compress them into the position they must occupy in the motor. Look for a loose joint in the ignition system.

Absence of Locking Devices Making Trouble

Editor THE AUTOMOBILE:

[2,674]—I purchased a car last year, and after it went on the road I discovered that there were no locking devices for the nuts

Fig. 3—Showing the fastening of a flywheel to the flange of the crankshaft by means of bolts with castellated nuts N and cotter pins for locking devices

or bolts and other small parts at any point. I have been losing more or less of my car ever since and the backing off of the nuts and the loosening up of the bolts adds a certain amount of danger to automobiling with always too much noise; moreover, I have to work on the car for a full hour every time I wish to take it out. Do you happen to think of a locking scheme that will serve my purpose in view of my aversion to split washers when studs are so much in evidence as they are in my case, considering the fact that if you lock the nuts on the studs themselves will back out.

Pittsburg, Pa. F. X. K.

Referring to Fig. 1 of a differential set in a live rear axle, it will be seen that the studs are kept from backing out by the simple expedient of drilling holes through the heads of the studs and threading stove-pipe wire through these holes so that if the studs unwind the wire will wind up. This is a simple locking scheme that has the virtue of being positive, and it applies perfectly where studs are used, because you can substitute cap screws for them, thus doing away with the nuts as well as the troublesome studs.

Mark the Gears Before Taking Them Out

Editor THE AUTOMOBILE:

[2,675]—I am convinced that I will have to take my automobile apart and do some overhauling work, but knowing quite well that I will be a poor hand at retiming the motor, I come to you for a method that will keep me out of trouble.

Kansas City, Mo. E. G.

Referring to Fig. 4 of a half-time train in a housing with the cover off, P_1 is the driving pinion on the end of the crankshaft, and the half-time gear A is marked by a line through the meshing teeth. This gear drives the camshaft C_1 at half the speed of the crankshaft. You can take your choice between making a mark with a scriber as shown in the figure or you can take a center punch and spot the teeth that mesh. In like manner the line can be drawn from the pinion P_1 to the idler B through the meshing teeth, and the line C from the idler B to the gear that drives the magneto may be likewise identified by means of a mark through the meshing teeth. Take the gears as you find them and identify the meshing teeth of all of the gears in the train by means of a scribed line or center punch mark, so that when you reassemble the parts you will be able to remesh the gears with the identical teeth that were in mesh at the time the motor was taken apart.

Wants to Know Where to Buy Supplies for an Electric Car

Editor THE AUTOMOBILE:

[2,676]—Would be pleased to know where one can buy all supplies for any electric car.

C. E. CARRIER.

111 Perry Av., Peoria, Ill.

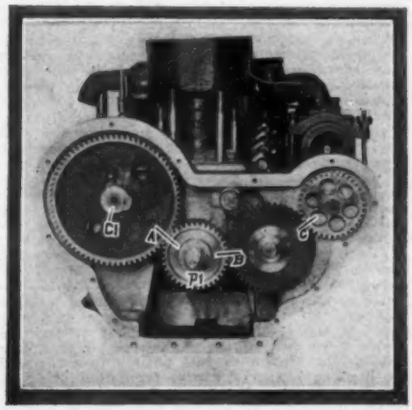


Fig. 4—Half-time train of a motor showing the gears in the housing, the cover being removed, and the method advised for the identifying of the meshing teeth

Meeting Recurring Troubles

Presenting a Series of the Most Probable Cases

A series of co-related short stories, accompanied by diagrams and characteristic illustrations, indicating the nature of the troubles that are most likely to happen to automobiles, discussing their causes and effects, all for the purpose of arriving at a remedy. It is the aim, for the most part, to show how these troubles may be permanently remedied, and as a secondary enterprise it is indicated how the automobilist can make a temporary repair, thereby enabling him to defer the making of a permanent repair until a convenient time arrives.

HAND CONTROL OF CARBURETERS IS COMMON PRACTICE—If it may be taken for granted that the rate of flow of gasoline through a nozzle is not parallel to the rate of flow of air in a pipe, it

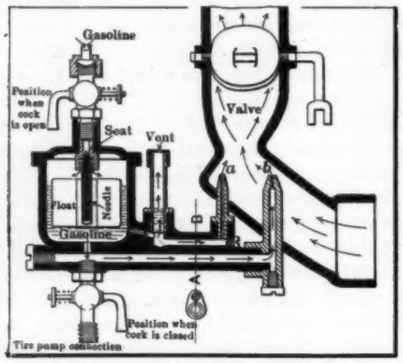


Fig. 59—Depicting principle of automatic type of carbureter and illustrating idea of cleaning out passageways through use of a tire pump.

will be seen that it is not possible to make an automatic carbureter, using a single nozzle and a single air intake, and realize a constant richness of the mixture for all changes of depressions as induced by the changing speed of the motor. It is on this account that single nozzle carbureters are provided with at least two air intakes, so arranged that the auxiliary intake is closed when the motor is operating at low speed, and the primary air intake being of restricted area and especially shaped in view of the conditions imposed, supplies the requisite quantity of air for the delivery of a rich mixture, considering the area of the orifice of the nozzle. As the speed increases, thus adding to the depression, gasoline squirts out of the nozzle at an increasing rate as compared with the rate of influx of air, and to avoid the unbalancing of the mixture the auxiliary air valve is opened more or less by hand, thus compensating for the unbalancing condition, hence arriving at a fair approximation of the result that might be obtained were carbureters perfectly automatic in a sense that they would supply a varying quantity of mixture of a constant richness. To get around the necessity of the hand control of the auxiliary air valve one plan is to use a supplementary valve, the same being actuated by suction and kept closed by a spring. The tension of the spring is regulated to offset the force of the suction during the time that the motor is operating slow and the mixture is being fed exclusively through the primary intake, but if the motor is speeded up, unless the auxiliary air valve is opened by the operator, the supplementary valve is opened automatically by the increasing suction, thus affording compensation. If it is desired to depart altogether from hand control the plan as shown in Fig. 59 is resorted to, in which the nozzle *a* gets a sparse supply of gasoline from the float bowl, and the nozzle *b* furnishes the principal supply of gasoline, but the latter nozzle is considerably smaller than the nozzles as employed in the hand-control types of carbureters. In operation when the motor is started the gasoline flows through the nozzle *b* in the regular way, and the accumulation of gasoline in the bent tube is picked up by the air train through the auxiliary nozzle *a*, thus making the rich mixture that is necessary when the motor is being started and during the slow speed performance. When the motor speeds up, however, the amount of gasoline that can get through the auxiliary nozzle *a* if added to the gasoline that passes out through the nozzle *b*, in view of the amount of air that flows through the system, is just enough to accomplish the high speed performance, regulation being by the damper valve above the depression chamber. In this way the rich mixture demanded in starting and for slow-speed work is delivered, and the excess of gasoline that ordinarily interferes with high-speed work is prevented.

USE THE TIRE PUMP TO CLEAN OUT THE CARBURETER—Gasoline, being a distillate from hydrocarbon products, is likely to carry a small amount of jelly akin to vaseline, and in the course of time this jelly serves as the nest for foreign matter, and it accumulates in the passageways of the carbureter, thus stopping off the flow of gasoline and interfering with the good performance of the mechanism. It is more or less a difficult task to unscrew parts and reach in with a piece of wire for the purpose of cleaning out the passageways; moreover, it is difficult to get the jelly to adhere to a piece of wire and to pass out of the necks of the passageways during the operation of cleaning in this way. A better plan is to apply pressure by means of a tire pump, but in order to accomplish the cleaning of the carbureter in this way it is necessary to put a stop-cock in the gasoline supply pipe at the approach of the carbureter, as shown in Fig. 59, and to attach the hose connection of the tire pump to a threaded part of the spout of the draincock in the manner as there depicted. Before pumping up, the gasoline supply should be shut off by means of the cock in the supply pipe, so that the pressure of air as it passes in through the draincock will find its opening after it passes through the carbureter by way of the nozzle, and the forcing of air through the passageways in this manner will suffice to blow the accumulations out of the system, but if there is a measure of resistance some gasoline can be let in from time to time until it is shown by clear gasoline coming out that the foreign matter has been removed from the carbureter.

IN THE MAKING OF A SPARK COIL—It is not uncommon to observe that the workmanship on spark coils is too poor to recommend that these coils be used on motors in automobile work. There is nothing about a motor that will give so much trouble in the fixing as a spark coil. There is **no intricacy** in motor work that is so little understood as the ignition system. If the spark coil gives out the probabilities are that not one automobilist in 100,000 can fix it. Considering the fact that the secondary voltage of a spark coil is always above 2500, and has been known to reach 16,000, it remains to state that the spark coil must be well insulated, otherwise the insulation will break down and put the spark coil out of action. Even if the coil is well made a little dampness will suffice to induce a leak of the secondary voltage, so that the work of which the spark coil may be capable under such conditions will be indifferent. The remedy to apply if dampness rests in the insulation is to put the spark coil in an oven and, holding the temperature at about 160 degrees Fahrenheit, bake the coil out, taking seven or eight hours to do so. If the temperature reaches 175 degrees Fahrenheit the probabilities are that the insulation will be permanently impaired. Moreover, if the coil is soaked in paraffin or other compound the temperature must be regulated so that the compound will not melt and run away. Fig. 60 is a sectional diagram of a spark coil, showing the relations of the parts, method of connecting up and the method of attaching the battery and spark plug. The connections of the condenser are also given. In the spark coil proper there are two windings, one of which, the primary, is of coarse wire with a relatively small number of turns which is wound over insulation that is placed over the iron core, and the secondary winding, of relatively fine wire, is wound over the primary winding. The core is made of a bundle of iron wire. An ordinary coil is composed of one-half pound of No. 18 B. & S. gauge copper magnet wire for the primary, and an equal weight of No. 38 B. & S. gauge copper magnet wire for the secondary. Three-quarters of a pound of each

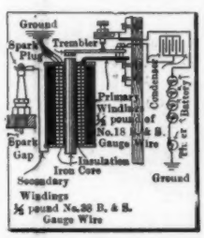


Fig. 60—Diagrammatic arrangement of a unit of a spark coil, showing the connections to battery, condenser and plug

of these sizes of wire would do better work. In some cases, instead of No. 18 for the primary, No. 20 is used, and instead of No. 38 for the secondary, No. 40 is used. The insulation of the magnet wire is of the "double" cotton variety in ordinary coils, but double silk insulation is superior, not only as to its insulating value, but because it occupies less space, thus permitting of a more compact winding, getting a greater number of ampere turns of wire per pound of the same on the core.

PISTON PINS SHOULD BE POSITIVELY LUBRICATED—While dependence may be placed upon the splash system of lubrication under all ordinary conditions if the system is well worked out, the fact remains that the pressure on the piston pin of a motor is always above 1000 pounds per square inch, and in quite a number of the examples of good motors this pressure approaches 1500 pounds per square inch. Fortunately, the pressure is momentary, and if the conditions of lubrication are at all good the oil that is squeezed out during the instant of high pressure will flow back in in time to cushion the next blow. Fig. 61 shows a ball check in the fitting that is screwed into a boss in the cylinder, the latter being placed in juxtaposition to the hole in the piston pin when the piston is on the lower dwell point, and the oil that is forced into the piston pin hole through the fitting must get by the ball check, but having passed in it cannot come out again on account of the obstruction that is formed by the ball, the latter having the facility of seating if pressure comes against it out of the cylinder. In putting fittings into the cylinders for the purpose of lubricating the piston pin it is quite useless to do so unless a suitable ball check is used to prevent cylinder pressure from blowing back through the oil system.

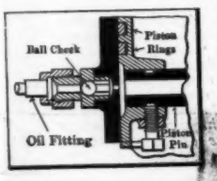


Fig. 61—Showing ball check fitting in wall of cylinder adjacent to piston pin when same is at bottom dwell point

FLEXIBLE MOUNTING DESIRABLE FOR MAGNETO—It is regrettable that the time has not arrived when the installation of magnetos on motors in automobile work can be on a common basis for the several makes, but the fact remains that the placing of a magneto on a ledge of the crankcase with the expectation that the alignment with the shaft of the driving member will be perfect is a vain proposition. It is far better to assume that there will be a visible imperfection of workmanship and to introduce a compensating joint between the magneto and the driving member. Fig. 62 presents an idea that has been suggested for this work, and neglecting the fact that the illustration does not show symmetry, it will be seen that the two parallel arms reaching up from the extremities of the driving and the driven shaft are maintained in their parallel relation by the use of a steel ball fitting in half sockets in the two arms. The cavities of the sockets are lubricated by oilers placed at the opposite extremities of the arms, the idea being to prevent noise. This plan affords a sufficient measure of universal action to take care of the little inequalities that might result when a well-installed magneto is taken off the motor and then put back by a man of little skill.

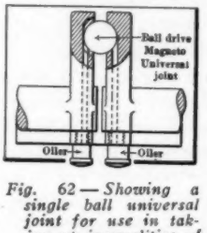


Fig. 62—Showing a single ball universal joint for use in taking up inequalities of alignment in mounting the magneto.

THE DRAG ROD SHOULD BE PREVENTED FROM DRIFTING AWAY—It is not believed that the average automobilist realizes the necessity of inspecting the drag rod of the steering equipment at sufficiently frequent intervals, nor can it be said that the ball and socket joints are properly protected from the ills of a mixture of sand and grease. In quite a number of the earlier makes of automobiles, some of which are still running, the insecurity of a poor drag rod system is in evidence, and a safety strap of leather, as shown in Fig. 63, might well be used. It would cost almost nothing to make the installation, and the drag rod would be prevented from disengaging at the ball and socket joint.

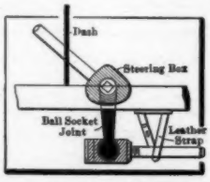


Fig. 63—A leather strap looped around the drag rod to prevent it from dropping down.

SINGLE BALL THRUST SYSTEM PROPOSED—In overhauling gear boxes in automobiles that are approaching the worn-out state it is frequently found that the ball bearings are sufficiently worn to make it inexpedient to continue their use with thrust and radial loads combined. The single ball joint, as shown in Fig. 64, may be applied in cases of this kind, and this type of thrust bearing is perfectly capable of doing the work as required in taking the thrust of the bevel drive. The ball presses against the button in the end of the shaft, and a hardened cap-screw in the cover bears against the opposite diameter of the ball. The fact that the ball drops a trifle below the axis of rotation of the shaft makes it twirl so that it will not wear out.

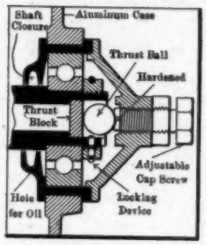


Fig. 64—A single ball thrust for use in a transmission gear system, taking the load off of the radial bearings.

IN THE FASHIONING OF HICKORY SPOKES—It seems to be a too common belief that heavy spokes will last longer than the relatively slender kind. The reverse is true. The secret of lasting spokes is in the sectioning of the same, remembering that the major axis of the ellipse should come in the plane of the wheel at the point of entrance to the felloe, and the same axis of the ellipse should be in the plane of the axle at a point near the miter, considering front wheels. In rear wheel work, Fig. 65 shows a good design of a spoke, it being the case that the pull on the brakedrum must be interpreted by the wood of the spokes of the rear wheels.

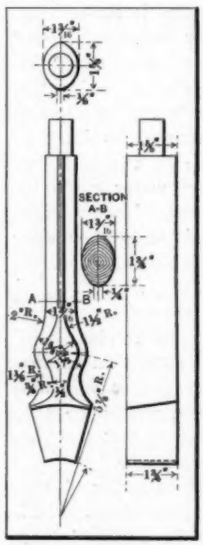


Fig. 65—Drawing of a hickory spoke for use in a rear wheel, showing excellence of proportions.

SPECIAL EQUIPMENT REQUIRED IN THE DISASSEMBLING OF CARS—It is quite an undertaking to so build an automobile that the components of the torsioning members will stay where they are put until it is desired to take them down. Illustrative of the idea, Fig. 66 of a brakedrum on the differential shaft is shown. This drum is pressed on to the reduced portion of the extremity of the shaft, the relation being that of a parallel fit, and it takes 15 tons effort of a press to fix the drum on the shaft so that it will stay there, and this is in addition to the use of a proper key, which is indicated. Obviously, it will be difficult to get this drum off the shaft, and a withdrawing clamp, which is shown in section, is essential to the success of the venture, and in well designed differential brake drums the hub is fashioned with an enlargement of the diameter at the outer extremity thereof, to accommodate the withdrawing fixture. With an equipment of this description the operation of withdrawing the brakedrum from the shaft is a perfectly simple one, requiring nothing more than the adjustment of the clamp into place, and the winding up of the jack screw, which has the effect of pulling the brakedrum off the shaft by pressing the screw against the end thereof, since the jaws of the clamp are then permitted to pull in the endwise direction upon the brakedrum.

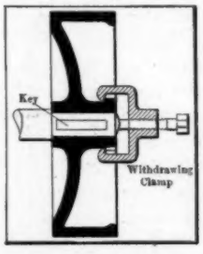


Fig. 66—Section of a differential brake-drum, showing a withdrawing clamp and the method of its use.

WHEN SIDE CHAINS MAKE TOO MUCH NOISE—If a side chain drive type of automobile performs silently in the first place, any noise that creeps in in the regular course of service must be traced to some disalignment or other deteriorating influence. Fig. 67 shows the conditions which obtain in not a few instances, in which the alignment of the sprocket pinion on the differential shaft is considerably out as compared with the sprocket-wheel on the brake-drum. This is brought about by an inequality in the lining up of the rear axle, due to the careless adjusting of the radius rods, unless on account of rough service the rear axle sags. As soon as noise creeps into the sprocket system it is important to investigate the cause and remedy the evil, otherwise the chains will be wrecked.

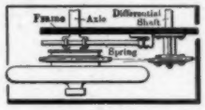


Fig. 67—Diagram of a side chain drive, showing disalignment of the two sprocket wheels

PISTON RINGS BURROW INTO THE CYLINDER WALLS AT THE END OF THE STROKE—In refined steam engine practice the cylinder walls are counter-bored, bringing the edge of the counter-bore at a point, so that the top piston ring will be half in the bore and half in the counter-bore when the piston is at the dwell point at the top of the stroke, the idea being to prevent the burrowing of the ring into the cylinder wall, which it is prone to do unless the facility of a counter-bore is afforded. Fig. 68 shows an automobile type of cylinder in section, in which this scheme of counter-boring has been neglected, and the top ring R1 will burrow into the cylinder in the course of time, and tightness will be defeated.

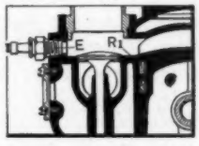


Fig. 68—Section through the cylinder and valve of a motor, showing the piston at the top dwell point with no counter-bore

VALVE SEATS CRACK IF THE COOLING WATER IS NOT UNIFORMLY DISPOSED—As an example of the design of valve seats that may be regarded as defective, Fig. 69 is given, in which it will be observed that the valve seat is formed in the plane of the connecting walls, as shown at A, and the bunching of metal due to fillets where the connecting walls join the functioning walls is impossible to avoid, and the troubles of uniform cooling of the valve seat are accentuated under such conditions; moreover, the quality of the metal is far from sound in the sections through fillets. This latter difficulty is due to the fact that in the cooling of the metal after it is poured into the molds the metal that cools last furnishes the source of supply of the metal that goes to make the more solid sections of the cylinder, and it flows away to the places of solid metal, thus leaving shrinkage holes at these intersections. In the better class of cylinder designs they are so fashioned that the metal between the valve seats and the cooling water is no thicker than the metal through the normal section of the cylinders, and some designers prefer to reduce the thickness of the metal at this point, the attempt being to make the seat metal solidify first, expecting that it will be dense and of fine grade.

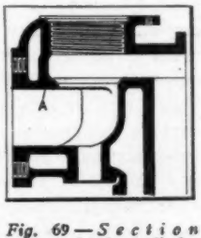


Fig. 69—Section through the cylinder and valve chamber of a motor, showing the valve seat metal in the plane of the lateral walls.

TEST OF OLDBERG MUFFLER.—The muffler was connected with 15 feet of 3-inch outside diameter by 1-16 wall tubing. The back pressure in this pipe with no muffler was but .25 pounds at 1500 R.P.M., and could not be read at all at 1000 R.P.M. The throttle valve was wide open at all speeds at which pressures were taken.

Speed by R.P.M.	Brake H.P.	Manom. in. of. Mercury.	Back Pressure.	H.P.
400	84	1.5	.73	19.2
500	81	1.75	.86	23.
600	75	2.00	.98	26.7
700	67	2.37	1.35	26.8
800	64	B	1.47	29.4
900	64	3.25	1.59	32.8
1000	61	3.75	1.84	34.8
1100	60	4.00	1.96	38.7
1200	60	5.00	2.45	43.3
1300	55	5.25	2.60	40.6
1400	53	5.75	2.80	42.2
1500	49	6.00	2.94	42.0

SPOKES ARE PRONE TO CREAK IN THE COURSE OF TIME—The life of a wheel in service depends primarily upon the quality of the hickory used in the spokes and felloes, and again upon the treatment that is given the wood from the time that it is cut in the forest until it is completed, and in the designing of the wheels, if the well-established principle involving the "dish" shape is disregarded, the result will be mediocre, and even in the best wheels as they are normally made the effect of the weather and service is likely to cause them to loosen up at the miter and bring on the creaking period. The way to correct this evil is to take the wheels apart, remove the wood and soak the same in raw linseed oil, letting it absorb as much of the oil as possible, and thereafter when the wood is put back and clamped up between the flanges of the hub, the wood will have swollen sufficiently, due to the absorption of the linseed oil, to re-establish the initial conditions; moreover, the linseed oil will remain in place and the repair will be permanent. (Fig. 70.) It is more than likely that this linseed oil treatment would be good for new wheels, were the spokes and felloes put in a chamber, and after hermetically sealing the same, exhaust the atmosphere therefrom, after which, admitting linseed oil, it would fill up the pores of the wood, and it would stay there. The wood so filled would have no capacity for dampness, nor would the linseed oil evaporate.

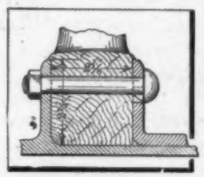


Fig. 70—Section of a spoke between the flanges at the hub, showing the method of clamping up and suggesting the use of linseed oil in the wood to prevent same from drying out and the creaking that results.

BREATHERS GIVE TROUBLE IF THEY ARE NOT PROPERLY MADE—In a four-cylinder motor there is a considerable squashing of the air within the crankcase, due to the fact that two of the pistons travel up together, simultaneously with the traversing of the remaining two cylinder pistons in the opposite direction. In addition to this squashing of the atmosphere therein, there is always a certain amount of leakage of hot gas around the piston rings, and it is customary to place breathers in the crankcase, the idea being that cold air will be sucked in through the breathers, and the excesses of air will be pushed out, using the same route, thus keeping the crankcase space relatively cool and preventing disagreeable noise, which might obtain in the form of wheezing in the absence of such preparation. Fig. 71 shows a form of breather that prevents oil from splashing out, which is one of the difficulties attending the use of a plain tube. In the example the mushroom-shaped cover of the breather tube is provided with openings A, and the baffle plates, DD, are so located that when the air rushes out oil entrained in the same impinges on the surfaces of the baffle plates, whence it falls back into the crankcase. The tube is bulged in the region of the baffle plates, so that the air in passing through cannot produce any noise.

Fig. 71—Section of a breather tube for a motor case, with a mushroom top and baffle plates upon which the splashing oil impinges, thus preventing it from getting out.

TESTS OF CONNECTING ROD BOLTS.—Nickel steel, ½-inch diameter, 20 threads per inch. Physical test: The soft bolts as received from the manufacturer stripped the thread at an average maximum fibre stress of 82,200 lbs. per sq. in.

A number of experiments in heat treating showed that the best results were obtained by heating to 1400-1500 deg. F., plunging in oil and temper drawn at 550-600 deg. F. This treatment gave an average ultimate tensile strength of 134,000 lbs. per sq. in. Per cent. of strengths gained by experimental work, 38 3/5 per cent.

Hard nut, heat treatment was used in all cases, the pull being made against the nut. All breaks were at the root of the thread.

No.	Carbon.	Mang.	Nickel.	Sulp.	Phos.	Sil.
1	.26	.56				
2	.25	.51				
3	.27	.57	3.15	.020	.022	.173
4	.28	.52				
5	.27	.58				
6	.30	.54				

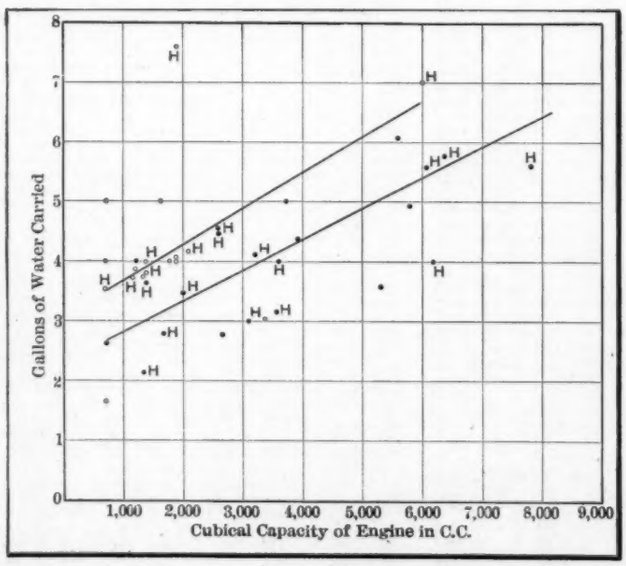
As to Water Cooling

A comparison of the cooling efficiency of forced and natural circulation as obtained from a series of tests of forty well-known cars, with the ultimate object of establishing a rule or determining approximately the volume of water necessary to cool an engine of given brake horsepower. (From the Automobile Engineer, London.)

AN examination of present practice as regards the cooling arrangements of motor-car engines shows that there is very little agreement between one designer and another. Not only are the relative advantages and disadvantages of forced and natural circulation still a matter of debate, but the nature of radiators, and still more the volume of water carried for each brake horsepower the engine is capable of developing, exhibit no sort of agreement when they are examined side by side. The principal advantage of thermo-syphon circulation is that by its use the cost of manufacture of the pump is saved, and, from the owner's point of view, a thermo-syphon system has no glands to leak, no moving parts to wear and never requires adjustment. Against natural circulation however, must be placed the fact that all pipes and water-ways require to be larger than is the case when the water is delivered to the cylinders under pressure. This means increased cost and increased weight, while it would be reasonable to assume that the radiator in a natural flow system ought to be larger, and the volume of water carried larger likewise. So it appears that so far as the manufacturing cost is concerned, a thermo-syphon cooled engine would be practically as costly to make as the pump-cooled type.

There ought to be some rule for determining approximately the volume of water necessary to cool an engine of given b.h.p. With the object of discovering some such rule based on actual practice we have obtained the volume of water carried on a number of well-known cars and from this data the accompanying diagram has been plotted. In this there are forty different engines, and they are distinguished as follows: The black dots represent engines cooled by pump circulation and the open circles engines cooled by thermo-syphon, while the symbol H placed beside either mark indicates that the radiator is of honeycomb type. It will at once be seen that there is no striking contrast between the amount of water used by one type as compared with the other. Certainly the average volume of water per b.h.p. for engines with convection circulation is slightly in excess of that for the others, but the difference is surprisingly small.

The two highest values in the diagram may probably be neglected, the highest of all being obviously very unnecessarily large. The two lines drawn across the figures probably represent the average of standard practice for pump-circulated and syphon-circulated engines, certainly if the large number clustered together on the 2,000 to 3,000 cubic centimeters lines are correct (and these all refer to modern cars) then the syphon line is not too low. Very possibly the pump line could be dropped still further, this depending upon the power of the pump.



Suggested curves of cooling water volumes for engines of varying horsepower

Cars are more often over-cooled than under-cooled, and the smaller the amount of water which has to be carried the better; provided cooling is quite satisfactory. Obviously, therefore, it behooves makers to ensure ample air draught through their radiators, and then to cut down the amount of water as much as possible consistent with efficient cooling.

Taking the modern cars which have been referred to above, that is to say those ranging in volume from 2,000 cc. to 3,000 cc., it will be noticed that they nearly all carry approximately four gallons of water weighing, of course, 40 pounds, whereas the average for pump-cooled cars in this section alone would be about 3 gallons. Probably the majority of these engines develop about 30 b.h.p., so a very rough and ready rule appears to be a gallon per ten maximum b.h.p. of the engine for pump circulation, and a gallon and a quarter per ten b.h.p. for syphon engines cooled by syphon circulation.

If the two lines are followed across the figure, however, this approximation appears not to be accurate; for instance the engines on the 7,000 cc. line would probably develop about 80 b.h.p., and the largest amount of water carried is only just over 7 gallons, the average being say 5 1-2 for pump circulation and 6 1-2 for syphon. This is reasonable because, as the size of passage and waterways generally increase, the ease of flow improves likewise, and a smaller proportion of water ought to give all the cooling which is needed. The absence of many large cars without a pump makes the upper end of the syphon line largely a matter for speculation, whereas there is at least some data for the pump line.

There is undoubted agreement as to the amount of water needed by a 30 b.h.p. engine, which can scarcely be accident, and one other thing may be taken as certain. This is that an engine needs no more water than is represented by the two curves, and can probably perform with complete satisfaction with a considerably smaller amount if the radiator has sufficient area and the various passages and waterways are sufficiently large.

So far only practical figures have been considered, and the real theory of water-cooling has not been approached at all. To attack the subject mathematically it might be assumed that the cylinder had to be maintained at a temperature not exceeding 200° Fahrenheit, that the average temperature inside the cylinder was—so much (calculable from the horsepower), that the mass of the cylinder was—so much, etc. If one could find the exact number of British thermal units which would have to be dissipated to the atmosphere, one would be but little nearer to the solution of the chief problem because the efficiency of the radiator and the restrictions of free movement of the water would be quite impossible even to guess. Still the efficiency of the water as a heat distributor or transferrer is an interesting, small and corollary point, and may be determined roughly from the diagram. Sometimes in testing engines on the bench the temperature of the cooling water is taken carefully, and from this the amount of heat wasted in the water may be determined. Sometimes the amount of heat so lost is equivalent to nearly half the brake horsepower of the engine, that is to say nearly half the heat value of each explosion is being deliberately thrown away. As most engines when undergoing a bench test are considerably over-cooled, it is probable that there is no need to dissipate more than 30 per cent. of the power of the engine, if so much even.

Returning again to the engines which we have mentioned as coming between the 2,000 cc. and 3,000 cc. lines, supposing some further assumptions are made and their horsepower is allowed to be 30, then it appears that 10 horsepower is the amount of work which three gallons of water can conveniently dispose of continuously, with ordinary modern equipment.

It may perhaps seem curious that so little has yet been determined concerning the true efficiency of radiators. There are an immense number of different tubular designs and more than several different types of honeycomb. Some of these must be much better for the purpose for which they are intended than others, and yet reliable information cannot be obtained concerning any one of them.

The laboratory testing of a series of typical radiators now in common use would be a comparatively simple task, and the conclusions could not fail to be valuable to designers. It is therefore to be hoped that some public-spirited investigator with the necessary time and equipment (this ought really to include some crude form of wind tunnel) will some day feel disposed to take the matter up.

Those who have been associated with the driving of racing cars will be well acquainted with the value of fresh cold oil for obtaining a momentary burst of extra speed, after the whole engine is really hot. This is not owing solely to the greater lubricating power of the cold oil, but to its actual cooling effect upon the metal with which it comes in contact, and after all this is in a sense reasonable enough, because all extra heat in the piston has to pass to the jacket water *via* a film of oil. Therefore it is more than likely that the regular efficiency of an engine might be improved if the oil were kept at a low temperature. This could be done without much trouble and, in conclusion, two methods may be suggested as worth experimenting with. One would be to divide off one or two tubes in the radiator and let the oil pass through them, but this would need somewhat special pumping arrangements. Another and better method would be to pass the cool water, from the bottom of the radiator, through the sump on its way to the cylinders' intake, by way of a few small pipes.

Calendar of Coming Events

Handy List of Future Competitive Fixtures

Race Meets, Runs, Hill-Climbs, Etc.

May 25.....New York City, Meeting Metropolitan Section of Society of Automobile Engineers.
May 27-31.....Chicago, Ill., Five-Day Tour to Indianapolis, Chicago Automobile Club.
May 29-31.....Chicago, Ill., Tour to Indianapolis, Chicago Motor Club.
May 30.....Camden, N. J., Track Races, South Jersey Motor Club.
May 30.....Denver, Col., Track Races, Denver Motor Club.
May 30.....Indianapolis, Ind., Five-Hundred-Mile International Sweepstakes, Motor Speedway (Circuit).
May 30.....Lakeside, Cal., Track Races.
May 30.....St. Louis, Mo., Reliability Run, Missouri State Automobile Association.
June 6.....New York City, Reliability Contest for Electrics on Long Island.
June 7.....New York City, Orphans' Day.
June 8.....Algonquin Hill Climb, Chicago Motor Club.
June 10.....Philadelphia, Track Races, Philadelphia Auto Trade Association.
June 10.....West Haven, Conn., Shingle Hill Climb, Automobile Club of New Haven and Yale Automobile Club.
June 10.....Philadelphia, Sociability Run for Electrics, Quaker City Motor Club.
June 10-11.....Chicago, Ill. (Hawthorne), Track Races.
June 13-14.....Milwaukee, Wis., Track Races, Fair Grounds (Circuit).
June 14.....Buffalo, N. Y., Orphans' Day, Automobile Club of Buffalo.
June 15-16.....Chicago, Ill., Fourth Annual Inter-Club Run, Chicago Automobile Club and Chicago Athletic Club.
June, 15, 16, 17....Dayton, O., Midsummer Meeting Society of Automobile Engineers.
June 15-20.....Endurance Run, Cañon City, Col., to Hutchison, Kan.
June 16.....Washington, D. C., Motor Car Carnival, Washington Automobile Club.
June 17.....Ossining, N. Y., Hill Climb, Upper Westchester Auto Club.
June 17.....Portland, Me., Hill Climb, Maine Automobile Association.
June 19.....Des Moines, Iowa, Annual Tour, Hyperion Field and Motor Club.
June 20-23.....Detroit, Mich., Summer Meeting National Gas and Gasoline Engine Trades Association.
June 21-29.....Glidden Tour, Washington, D. C., to Ottawa, Canada.
June 20.....St. Louis, Mo., Reliability Run, Auto Club of St. Louis.
June 24.....New York, Track Races, Brighton Beach (Circuit).
June 24.....Philadelphia, Hill Climb, Quaker City Motor Club.
June .....Denver, Col., Reliability Run, Denver Motor Club.
June .....Norristown, Pa., Hill Climb, Norristown Auto Club.
June .....Oklahoma, Reliability Run, Oklahoma Auto Association.
July 1.....Riverhead, L. I., Road Race (Circuit).
July 1-3.....Motor Contest Association's Catskill Run and Hill Climb.
July 4.....Detroit, Annual Track Meet, Wolverine Automobile Club.
July 4.....Bakersfield, Cal., Road Race, Kern County Merchants' Association.
July 4.....Denver, Col., Track Races, Denver Motor Club.
July 4.....Port Jefferson, N. Y., Hill Climb (Circuit).
July 4.....Worcester, Mass., Hill Climb (Circuit).
July 5-22.....Winnipeg, Man., Fourth Canadian Competition for Agricultural Motors.
July 7.....Taylor, Tex., Track Races, Taylor Auto Club.
July 8 or 15.....Philadelphia, Track Races, Belmont Park, Norristown Auto Club.
July 12.....Indianapolis, Indiana Four-State Tour, Indianapolis Auto Trade Association.
July 14.....Philadelphia, Commercial Reliability Run, Quaker City Motor Club.
July 17-19.....Cleveland, O., Three-Day Reliability Run of the Cleveland News.
July 17-22.....Wisconsin Reliability Run, Wisconsin State Automobile Association.
July 29.....Philadelphia, Track Races, Belmont Park (Circuit).
July .....Amarillo, Tex., Track Races, Panhandle Auto Trade Association.
Aug. 1.....Chicago, Ill., Commercial Reliability Run, Chicago *Evening American*.
Aug. 12.....Detroit, Track Races, Fair Grounds (Circuit).
Aug. 12.....Philadelphia, Reliability Run, Quaker City Motor Club.
Aug. 25-26.....Elgin, Ill., National Stock Chassis Road Race, Chicago Motor Club (Circuit).
Aug. .....Denver, Col., Hill Climb, Denver Motor Club.
Sept. 1.....Chicago, Ill., Commercial Reliability Run, Chicago Motor Club.
Sept. 1.....Oklahoma, Reliability Run, *Daily Oklahoman*.
Sept. 4.....Denver, Col., Track Races, Denver Motor Club.
Sept. 4.....Indianapolis, Track Races, Motor Speedway (Circuit).
Sept. 7-8.....Philadelphia, Track Races, Philadelphia Auto Trade Association.
Sept. 8.....St. Paul, Minn, Track Races, State Fair (Circuit).
Sept. 12-13.....Grand Rapids, Mich., Track Races, Michigan State Auto Association.
Sept. 15.....Knoxville, Tenn., Track Races, Appalachian Exposition.
Sept. 16.....Syracuse, N. Y., Track Races, State Fair (Circuit).
Sept. 23.....Lowell, Mass., Road Race (Circuit).
Oct. 3-7.....Danbury, Conn., Track Races, Danbury Agricultural Society.
Oct. 7.....Philadelphia, Fairmount Park Road Race (Circuit).
Oct. 9-13.....Chicago, Ill., Thousand-Mile Reliability Run, Chicago Motor Club.
Oct. 16-18.....Harrisburg, Pa., Reliability Run, Motor Club of Harrisburg.
Oct. 19-21.....Atlanta, Ga., Track Races, Speedway (Circuit).
Oct. .....Denver, Col., Track Races, Denver Motor Club.
Nov. 1.....Waco, Tex., Track Races, Waco Auto Club.
Nov. 3-4.....Philadelphia, Reliability Run, Quaker City Motor Club.
Nov. 3.....Savannah, Ga., Light Car Road Race (Circuit).
Nov. 7-10.....Los Angeles-Phoenix Road Race, Maricopa Auto Club.
Nov. 9-11.....San Antonio, Tex., Track Races, San Antonio Auto Club.
Nov. 10.....Phoenix, Ariz., Track Races, Maricopa Auto Club.
Nov. 30-Dec. 2, 3...Los Angeles, Cal., Track Races, Motordrome.
Dec. 25-26.....Los Angeles, Cal., Track Races, Motordrome.

Foreign Fixtures

May 28.....Le Mans, France, Hill-Climb for Touring Cars.
May 28.....Start of Touring Car Reliability Trials in Germany.
June 1.....Bucharest, Roumania, Speed Trials.
June 4.....Trieste, Austria, Hill-Climb.
June 18.....Boulogne, France, Voiturette and Light-Car Road Races.
June 25.....French Light Car Race, Coupe des Voiturettes, Boulogne-sur-Mer course.
June 25-July 2.....International Reliability Tour, Danish Automobile Club.
July 5 (to 20).....Start of the Prince Henry Tour from Hamburg, Germany.
July 9.....Sarthe Circuit, France, Grand Prix of Automobile Club.
July 13-20.....Ostend, Belgium, Speed Trials.
July 21-24.....Boulogne-sur-Mer, Race Meet.
Aug. 6.....Mont Ventoux, France, Hill Climb.
Sept. 2-11.....Roubaix, France, Agricultural Motor Vehicle Show.
Sept. 9.....Bologna, Italy, Grand Prix of Italy.
Sept. 10-20.....Hungarian Small-Car Trials.
Sept. 16.....Russian Touring Car Competition, St. Petersburg to Sebastopol.
Sept. 17.....Semmering, Austria, Hill-Climb.
Sept. 17.....Start of the Annual Trials Under Auspices of *l'Auto*, France.
Oct. 1.....Gaillon, France, Hill-Climb.

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BROADENING the range of usefulness of freight automobiles is the problem of the hour, and the leading article in the THE AUTOMOBILE this week is founded on a plan that is being worked to some extent, but it is not believed that wholesale houses in general are fully alive to the possibilities as they are involved in the use of automobiles as a means of transportation of "samples," affording to commercial representatives a direct and economical way of reaching every possible customer in a given district. This plan has the additional virtue of creating a favorable impression upon a buyer, and in view of the fact that advertising is the creating of a favorable impression, remembering the efficacy of this type of advertising, it is not too much to say that this principle will bring the same shower of results if it is introduced into selling methods as well.

* * *

TOURING, as a pastime, has its pitfalls and its handicaps due for the most part to lack of preparation on the part of the owners of automobiles, and among the things that they overlook, too little mention is made of the fact that they fail to take into account a dictum in law, *i.e.* "Ignorance of the law excuses no man." The average automobilist does not even know the laws governing the use of the highways in his own State, and it is more than likely that he falls short of great familiarity with the police regulations in his own town. On the principle that it takes a capable constitutional lawyer to tell his clientèle how to circumvent the constitution, it takes a well-informed automobilist to checkmate a too zealous constable, and after all, considering the narrow-minded gauge of this type of vermin, the mentally well-equipped automobilist would scarcely have to burn the midnight oil to obtain the requisite quota of legal lore. In THE AUTOMOBILE this week is given a brief and accurate résumé of the automobile laws of all the States.

* * *

SHOP SYSTEM must of necessity become the subject of keen and persistent consideration in the near course of events, and while it is true that the advanced makers of automobiles are alive to the possibilities, there is evidence which would seem to indicate that the trailers among the builders of cars have not taken stock of the consequences that make wreckage of ill-contrived efforts. It has been shown on important occasions that workmen are extravagant in their motions as they proceed with their tasks, thus wasting their own time and that of the machine tools which they monopolize. The principle that has long actuated the artisan, in which he exerts an undue influence, foreshadowed by the fact that he has "learned the trade," is all very well in a repair shop where "time and material" is the basis of settlement, but in a plant devoted to the manufacture of automobiles, the man who "soldiers" because he learned the trade, must be taught to obey orders; but this excellent situation can only come when the makers of automobiles employ foremen who are sufficiently skilled in the art to give orders. There are entirely too many men in charge of work, who, themselves, are incapable of doing the very work that they must assign to the men at the tools. The result is that the artisans become the directors of their own individual efforts.

* * *

WRITING the finale of the automobile designing situation will be the duty of some editor in the far-away future, but this fact does not deprive the editors of to-day of the pleasure and enjoyment which is noted in the substantial character of the automobiles that are to be placed at the disposal of a discriminating clientèle during the present year. The undertaking will undoubtedly be confronted by two or three complications, and how to describe a good automobile without repeating the formula in an effort to recount the virtues of a less worthy product is a problem of the first magnitude. Condemning by faint praise is, of course, the artifice of the writer whose frankness is warped by business considerations, and sophistry serves as the embellishment of the structures made, but automobilists are expressing a preference for a clear presentation of facts. The indications are that designers are adhering in the main to the ideas that proved to be of value in the service of the last year, and revision seems to be the principal undertaking among the makers of the best types of cars.

* * *

CLUB life as it obtains among automobilists is confined to less than 10 per cent. of the citizens who have purchased and are using automobiles. This means that 90 per cent., in round numbers, of the automobilists do not think enough of a club to join in its issues and pay for the support of its activities.

Ready for Start at Indianapolis

Field of 46 Racers to Present Big Spectacle

The 500-mile automobile race over the Indianapolis Speedway next Tuesday will mark another step in the development of speed, and as such will prove of much importance to humanity. The field is so large that all the cars cannot be lined up, and a remarkable idea has been brought to bear to get the cars away, following the pace of a non-contestant. Preparations have been made to accommodate more than 100,000 spectators. It is expected that a speed of over seventy miles an hour will be made.

INDIANAPOLIS, IND., May 22—Technical examinations of the 46 cars entered for the 500-mile race, May 30, is progressing and will probably be completed before midweek and on Friday the eligibility trials will begin. Each entrant must show ability to make a mile dash at the rate of at least 75 miles an hour.

The start of the race will undoubtedly prove to be one of the most spectacular features ever introduced into automobile racing. The size of the field prohibits a simultaneous standing start, as the Speedway, big as it is, is not wide enough to allow that number of cars to line up. The problem has been met in a curious way. Carl G. Fisher will act as pacemaker for the starting round. Mr. Fisher is president of the Speedway association and according to arrangements he will make the circuit at the rate of 40 miles an hour. The cars will line up four deep behind the tape and will follow the moderate pace for one round.

Coming up to the tape after the circuit, Mr. Fisher will drop out and the racers can then take up any pace they desire. The cars will be timed from the instant the first one of the contestants passes the tape after the first round.

The signal for the real start will be the firing of a bomb as well as the dropping of the flag.

The course will be opened to the public at 6:30 o'clock in the morning, but the start will not take place until 10 o'clock. Fully 100,000 persons are expected to witness the event and preparations have been made to accommodate even more.

The race will be finished before 5 o'clock in the afternoon if the average speed made is much in excess of 75 miles an hour. It has been announced that more than 100 men will be employed in keeping track of the cars as they whirl about the brick course.

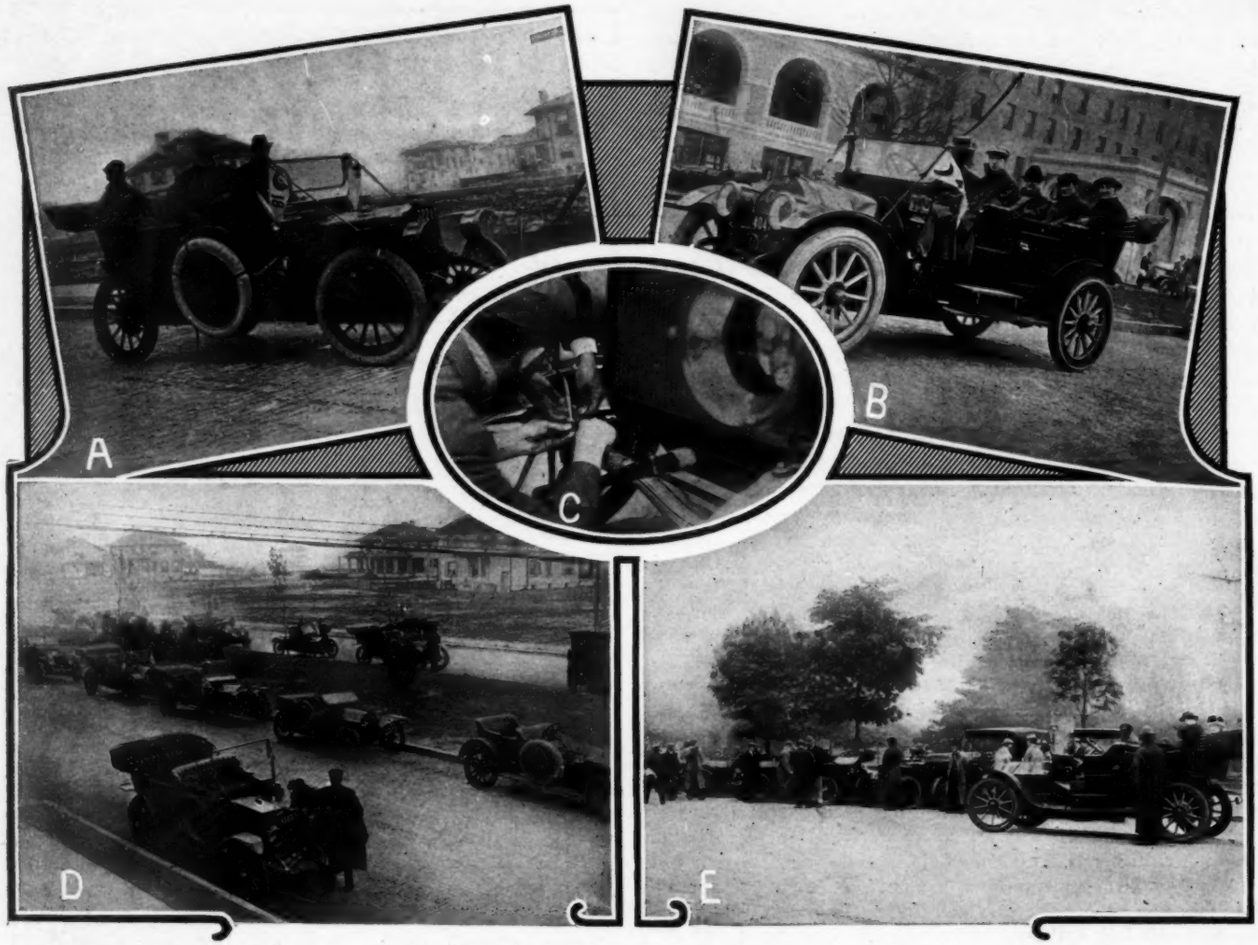
The list of entrants is as follows:

Car.	No. Cyls.	Cu. In. Disp.	Driver.
Case	4	284	Lewis Strang.
Simplex	4	597	Ralph de Palma.
Inter-State	4	390	C. B. Baldwin.
National	4	589	John Aitken.
Pope-Hartford	4	390	Louis Disbrow.
Pope-Hartford	4	390	Frank P. Fox.
Westcott	6	421	Harry Knight.
Case	4	284	Jagersberger.
Case	4	284	Will Jones.
Stutz	4	390	Gilbert Anderson.
Mercedes	4	583	Spencer Wishart.
Amplex	4	443	W. H. Turner.
F. A. L.	4	298	J. F. Gelnaw.
F. A. L.	4	298	W. H. Pearce.
Knox	6	559	Fred. Belcher.
Buick	4	594	Arthur Chevrolet.
Buick	4	594	Charles Basle.
Benz	4	521	Eddie Hearne.
Alco	6	580	Harry Grant.
National	4	447	Charlev Merz.
National	4	447	Howard Wilcox.
McFarlan	6	377	Fred. Clemens.
McFarlan	6	377	Bert Adams.
Jackson	4	355	Fred. Ellis.
Jackson	4	355	Harry Cobe.
Jackson	4	432	Jack Tower.
Cutting	4	390	Ernest Delaney.
Fiat	4	589	David-Bruce-Brown.
Lozier	4	544	Harold Van Gorder
Firestone-Col.	4	432	Lee Frayer.
Marmon	4	445	Joe Dawson.
Marmon	6	477	Ray Harroun.
Lozier	4	544	Ralph Mulford.
Lozier	4	544	Teddy Tetzlaff.
Apperson	4	546	Herb Lytle.
Mercer	4	300	Hughie Hughes.
Mercer	4	300	Charles Bigelow.
Simplex	4	597	Ralph Beardsley.
Fiat	4	497	Caleb Bragg.
Velie	4	334	Arthur Gibbons.
Velie	4	334	Howard Hall.
Cole	4	471	Bill Endicott.
Cole	4	386	Johnny Jenkins.
Amplex	4	443	Walter Jones.
Benz	4	521	Bob Burman.
Benz	4	521	Billy Knipper.

McComb Pennsylvania Production Manager

Henry G. McComb, whose work as Chief Engineer of the E. R. Thomas Motor Company, extending over a period of three years, added lustre to his previous well-known efforts, has accepted the position of production manager of the Pennsylvania Auto Motor Company, Bryn Mawr, Pa. The intimate acquaintances of Mr. McComb have long been aware of his penchant for systematic work, and his studies in this field, accompanied by the vim, with which he undertakes difficult tasks, bespeaks success for any effort that he may undertake. There is something more than the mere accepting of a position on the part of Mr. McComb in this new venture; it is the opening up of a broad situation in which the skill of an actual engineer supplants the rule-of-thumb of the "accelerator." At the beginning of the automobile industry men of energy were used in the shop because it was necessary to get through somehow, and in many cases the energy was misplaced, and the results were bad. It is now known that men of skill are wanted; energy is a secondary requisite, but when skill is attended by energy, one man readily accomplishes the tasks that might otherwise have to be done by a combination of men, as when one of them furnishes the skill and the other does the boosting. In the case of Mr. McComb, in accepting this new position, he is leading the way that other engineers will have to take in order that "acceleration" will be effective in the plants. Henry G. McComb is a leading member of the Society of Automobile Engineers, and in addition to his other activities, his contributions to the technical press, although conservative, have been pointed and learned. President William B. Hurlburt, who has recently taken hold of the "Pennsylvania," is gathering a capable force, and much activity is promised for the 1912 campaign with such able men at the helm.

Henry G. McComb, production manager of the Pennsylvania Auto Motor Company at Bryn Mawr



A—The Maxwell member of the Crescent team did well on flat and hill
B—There was also a Chalmers in the Crescent Athletic Club team
C—How the starting cranks were sealed before leaving all controls
D—Part of the line-up in the fog at Long Beach
E—Just before the first car was sent away from the starting line

Inter-Club Run Opens Local Season

L. I. A. C. Wins Trophy from C. A. C. in Two-Day Tour

Opening the metropolitan season of automobile sports, the Long Island Automobile Club and the Crescent Athletic Club contested Saturday and Sunday for permanent possession of the Pardington Trophy. The former won the cup with six clean scores and one disqualification against a total penalization of 575 points. Seven cars participated for the L. I. A. C. and eleven represented the Crescent Athletic Club. A delightful time was enjoyed by all during the run and an elaborate entertainment was arranged at Riverhead, where the tourists spent Saturday night.

WITH the inter-club run of the Long Island Automobile Club and the Crescent Athletic Club Saturday and Sunday the metropolitan automobiling sporting season of 1911 was auspiciously inaugurated. The Long Island Club won the trophy, but the winning or losing of it signifies little as to the running qualities of the cars engaged or the skill of the handling. These were all that could be desired. The cars were high-class automobiles in the main and they were handled by their owners with a marked degree of expertness.

The start was scheduled for 7:30 o'clock Saturday morning from Prospect Park Plaza, but it was five minutes afterward before the first car was given the word to go. The contest was a "sealed-bonnet" affair under an arbitrary set of rules to stimulate interest among the members. The cranks also were sealed and breaking the ribbons meant a penalty of twenty-five points, no matter how the break happened. Mechanical adjustments and replacements except work on tires with the motors running were subjected to heavy penalty. A motor stop which necessitated using the starting crank naturally cost twenty-five points and so did the taking on of gasoline, oil or water outside of controls.

Particular emphasis was also laid on carrying full passenger loads, and one car was disqualified for not bringing in its full complement of passengers to one of the intermediate controls.

Eleven cars represented the Crescent club and seven ran in the colors of the Long Island organization. Each car in both teams made every control within the time limit. The course for the two days was approximately 350 miles, the last stretch

affording the motorists quite a latitude of road selection

A late start was made Sunday morning, the first car being sent away at 9 o'clock. The procession headed for Greenport, where the cars were checked and started back to Riverhead. From there they proceeded to Smithtown, where Sunday dinner was served and supplies taken on board.

It was 3 o'clock before the tourists took the road again, having been given leave to proceed to the country club of the Crescents at Bayridge by any roads they wished. This broke up the procession to a large extent, but before the expiration of the time limit all eighteen of the contestants and most of the official cars arrived at the beautiful club quarters.

A preliminary canvass of the situation developed the fact that the Long Island Automobile Club team had won the Pardington trophy again, as no mechanical trouble had been experienced by any of the contestants on that side. Later it was discovered that one of the Long Island cars had been assisted by a professional driver and it was promptly disqualified.

This made the penalization of the team 300 points, the other six cars having clean scores. The prize, under its condition of award, is given to the club with the least average penalization. Thus the Long Island Automobile Club team averaged 42.85 demerits per car.

The showing of the Crescent Athletic Club team was not so good. Seven cars came through with clean scores, both mechanically and upon the road. One car was disqualified and assessed 300 points because it came into the Riverhead control with only three passengers. The other passenger was anxious to reach Riverhead and as the car had been very conservatively driven it seemed to him that it might come in too late for the big show. He therefore transferred to another car a few miles out of control. The disqualified car reached control on time and had a perfect score otherwise, but as it did not bring in all its passengers it was ruled out. Another Crescent contestant was given 175 demerits for breaking seals and doing some mechanical work. Another broke two seals and took on water, earning 75 points, while another stalled the motor, getting 25 points. The total penalization was 575, which produces an average of 52.27. If the disqualified Crescent car had finished with a clean score the award would have been reversed.

H. G. Martin acted as chairman in charge of the Crescent team and Frank G. Webb represented the Long Island Club.

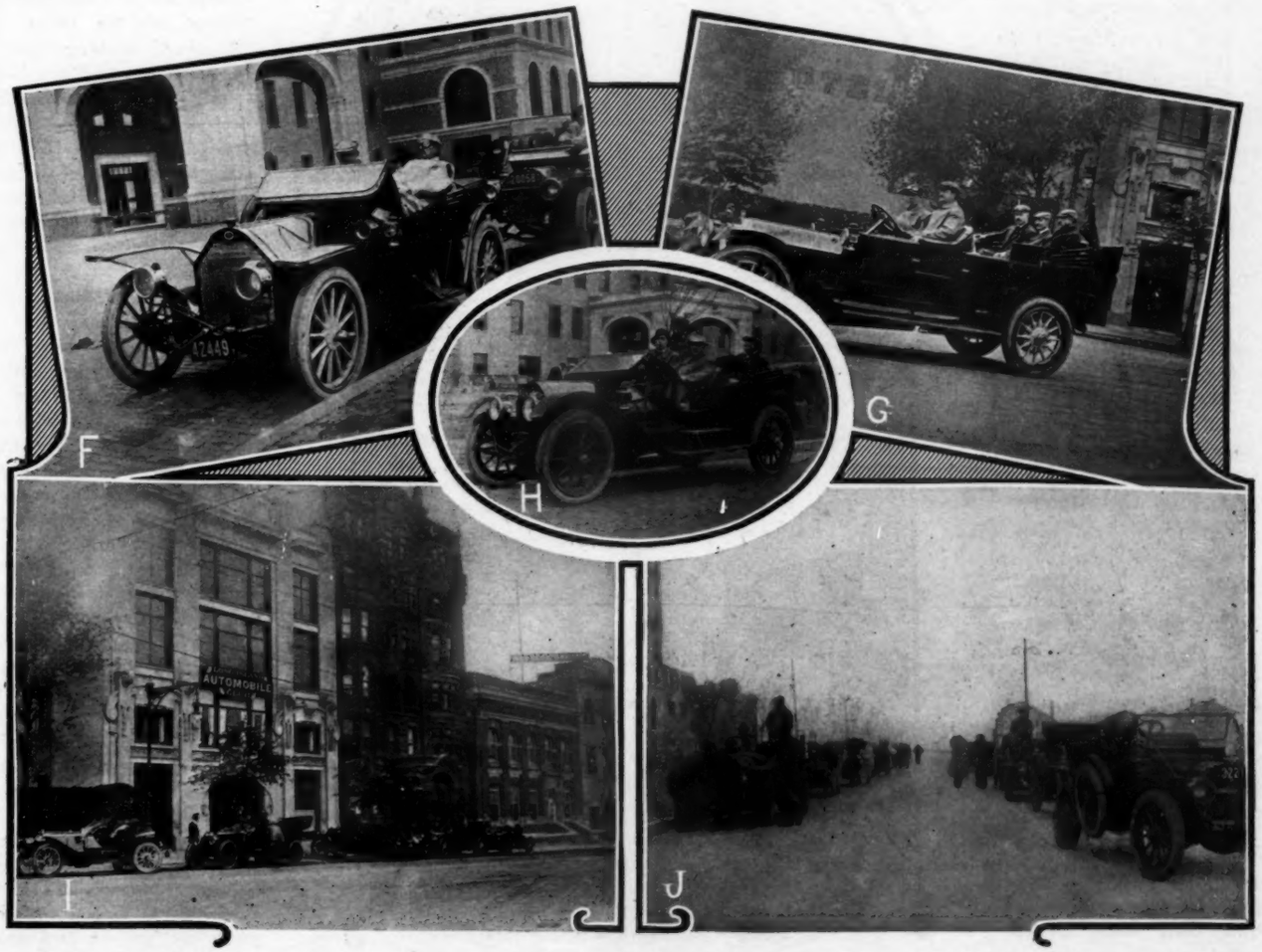
The contestants enjoyed supper and an entertainment at the Crescent Club at the conclusion of the run. Those who took part in the tour were as follows:

LONG ISLAND A. C.

No. 3—J. F. Frazee, Regal.
No. 5—H. G. Andrews, Buick.
No. 7—William Schimpf, Royal.
No. 9—Harry Grattan, Stevens-Duryea.
No. 21—E. B. Jordan, Jr., Pope Hartford.
No. 23—A. W. Swanstrom, Chalmers.
No. 27—C. H. Humphreys, Stearns.

CRESCENT A. C.

No. 2—George Brower, Franklin.
No. 4—James Masterman, Chalmers.
No. 6—G. W. Cropsey, Nordyke-Marmon.
No. 8—W. H. Stiles, Buick.
No. 10—G. J. Patterson, Stearns.
No. 12—F. C. Whilley, Locomobile.
No. 14—W. H. Brown, Chalmers.
No. 16—Lowell M. Palmer, Palmer-Singer.
No. 18—H. C. Pulis, Maxwell.
No. 20—F. C. Loughlin, Hudson.
No. 22—A. P. Palmer, Palmer-Singer.



F—Underslung Regal, one of the L. I. A. C. team
G—Locomobile carrying Chairman Webb and President Kowenhoven, B. M. V. D. A.
H—Chalmers contesting car, a member of the L. I. A. C. team
I—The start was from the Long Island Automobile Club
J—Preparing to leave Long Beach, the first noon control

W., C. & P. Entertain Little Cripples,

A—How the automobiles looked as they passed through Prospect Park.

B—At Coney Island—entertaining the guests of the occasion
D—C. F. Wyckoff completing details of the event
E—Taking the crippled children aboard in front of the Free Industrial School

C—W. C. & P. Committee and the guardians of the peace who established a right of way

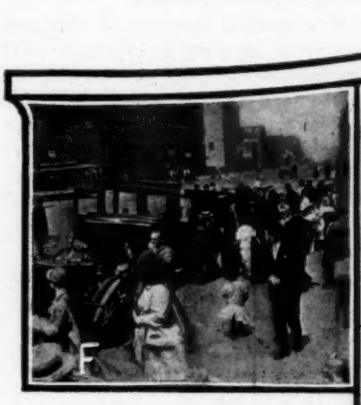
The fifth annual outing under the auspices of Wyckoff, Church & Partridge, New York, was given May 23, to the crippled children of the Free Industrial School. The run started at 10 o'clock in the morning, making the distance from the establishment of W., C. & P., at Broadway and Fifty-sixth street to the Crescent Club at Bay Ridge in time to serve an ample luncheon to the many little guests, permitting them thereafter to enjoy a romp on the club grounds prior to the principal entertainment, which was given at Luna Park in Coney Island.

REPEATING the successes of the preceding four years, the firm of Wyckoff, Church & Partridge conducted its fifth annual automobile ride for the benefit of the crippled children of the Free Industrial School of New York, taking the little ones from their home on the upper west side through the streets of New York, including Fifth avenue to the Fourth street park, and thence across to the Williamsburg Bridge, connecting with Bedford avenue, Brooklyn, and over the beautifully macadamed streets of the "City of Churches," striking Hamilton avenue, which was followed to the point of connection with the shore road, and thence to the Crescent Athletic Club with its beautiful surroundings on the inner bay in sight of the forts at the narrows.

The caravan comprising 20 automobiles arrived at the club just in time for luncheon, and the entire organization of the Crescent Athletic Club worked with a will, giving the little guests the same high class service that it accords its members on festive occasions. The luncheon was put up at Churchill's and carried in hampers on one of the automobiles, and when it was spread out on the boards at the Crescent Athletic Club, including a large supply of half-cream furnished by the club, it was the fitting foundation for a most enjoyable occasion.

After the luncheon, which was participated in by the little guests, and those who looked after their welfare, a sojourn was made to the ample grounds of the club, where some of the youngsters played baseball, but the less fortunate of them were

with Automobile Ride and Luncheon

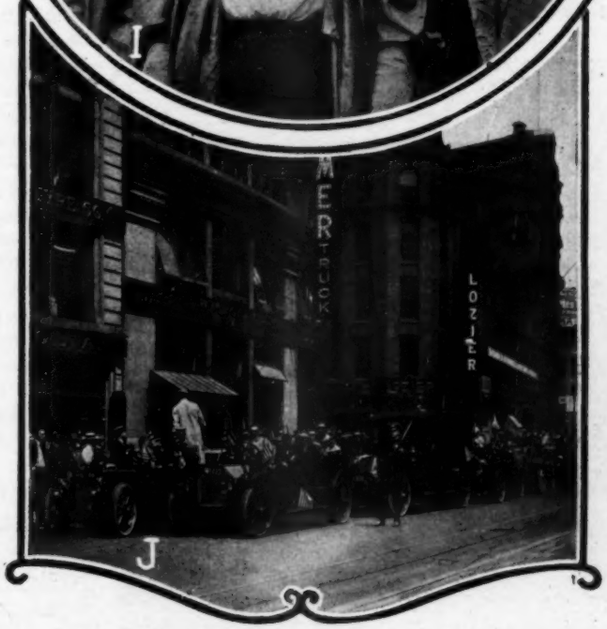


F—Automobiles in front of the Free Industrial School ready for their precious cargo

G—The crippled boys enjoying every minute of the time

H—Just before the start from the Crescent Club

I—Mrs. Partridge with Mrs. Drummond on the right, and ladies' aides who looked after the welfare of the crippled children



J—Line-up of the cars with the children aboard in front of the Wyckoff, Church & Partridge Headquarters

entertained in ingenious ways. In the course of time, the automobiles were lined up on the lawn, and the little guests were photographed prior to the long and interesting ride over the shore road, skirting Fort Hamilton, crossing the viaduct and down Cropsey avenue for its entire length, finally crossing the bridge entering the precincts of Coney Island.

The weather was fine, with just enough of a breeze to keep the heat from being oppressive, and those who love Coney Island so well were there in large numbers, doing the things for which they are mostly noted, but the interest they took in the long string of automobiles filled to the brim with the little cripples who arose to the glee of the occasion, would seem to indicate that the veterans of this ingenious resort were having a new experience. The cars finally drew up at the entrance of Luna Park and the red-coated ticket-takers, who ordinarily concern themselves in matters of money, bowed their prettiest to the little protegés of Messrs. Wyckoff, Church & Partridge, and it was the consensus of opinion among the elders of the trip that the management at Luna Park is well versed in the wiles of entertainment, with a conspicuous penchant for making little cripples overlook the degrees of their handicap.

All who participated in the event were mightily impressed with the success of the venture, and there was striking agreement to the effect that this type of philanthropy, if such it may be called, is a monument to the good judgment of those who were responsible for the undertaking. The representatives of the firm were indefatigable in their ceaseless efforts, and the ladies who went along shouldered their responsibilities with equanimity, aiding Mrs. Partridge at every turn in the smooth working out of the manifold undertakings, and Mrs. Drummond, as the responsible head of the philanthropy known as the Free Industrial School, expressed the highest appreciation of the effort on the part of the W., C. & P. organization to extend its activities in the automobile line to the benefit of those who have too many misfortunes.

At the conclusion of the trip, when the children were landed at the school without having experienced a single unpleasant incident, it was voted by all who went along that an outing of this sort is an event that is to be looked forward to with pleasure.

Board of Trade Elects Officers

By the election of officers, the Automobile Board of Trade completed its organization last Friday when a quorum of the directors met at headquarters in New York. The following officers were selected: Col. Charles Clifton, president; Charles C. Hanch, vice-president; Col. George Pope, treasurer and Benjamin Briscoe, secretary.

H. A. Bonnell who has been acting as General Manager of the A. L. A. M. was appointed Acting General Manager of the Automobile Board of Trade.

While 84 concerns were numbered among the forces of the A. L. A. M. only 50 of them were full members, the other 34 being licensees. The entire list of full members of the A. L. A. M. were selected as charter members of the new organization.

This list includes the following: American Locomotive Co., American Motor Car Co., Apperson Bros. Auto. Co., Autocar Co., Bartholomew Co., Brush Runabout Co., Buckeye Manufacturing Co., Buick Motor Co., Cadillac Motor Car Co., Chalmers Motor Co., Columbia Motor Car Co., Corbin Motor Vehicle Corp., Dayton Motor Car Co., Elmore Manufacturing Co., Everitt-Metzger-Flanders Co., H. H. Franklin Mfg. Co., Haynes Automobile Co., Hudson Motor Car Co., Jackson Automobile Co., Knox Automobile Co, Locomobile Co. of America, Lozier Motor Co., Matheson Motor Co., Maxwell-Briscoe Motor Co., Mercer Automobile Co., Metzger Motor Car Co., Mitchell-Lewis Motor Co., Moline Automobile Co., Moon Motor Car Co., National Motor Vehicle Co., Nordyke & Marmon Co., Oakland Motor Car Co., Olds Motor Works, Packard Motor Car Co., Peerless Motor Car Co., Pierce-Arrow Motor Car Co., Pope Manufacturing Co., Premier Motor Mfg. Co., Pullman Motor Car Co., Reo Motor Car Co., Royal Tourist Car Co., Alden Sampson Mfg. Co., Selden Motor Vehicle Co., F. B. Stearns Co., Stevens-Duryea Co., Studebaker Automobile Co., E. R. Thomas Motor Car Co., Waltham Mfg. Co., Willys-Overland Co, Winton Motor Carriage Co.

S. A. E. Prepares for Dayton Meeting

The eyes of the automobile engineering world are upon Dayton, Ohio, where the Society of Automobile Engineers will hold its annual Summer meeting the middle of next month. On Thursday morning, June 15, about 500 engineers engaged in the automobile and kindred industries will assemble at the Algonquin Hotel, and occupy the rest of the week in sessions devoted to business, professional discussion and recreation.

The Transactions resulting from the meetings of the S. A. E. are a valuable contribution to automobile engineering. Perhaps the greatest advantage of S. A. E. membership is the interchange of ideas and opinions between the members who meet twice a year in national convention, in addition to sectional meetings held in different parts of the country every month.

The S. A. E. has at present a General Standards Committee, consisting of about eighty engineers, covering nearly every field affiliated in any way with automobile production. Between six and seven hundred new members have come into the organization within the past year, among them being many of the best known engineers of the country, not only in the motor car line but in the allied industries. This has been under the successive presidencies of Howard E. Coffin and Henry Souther, and the general managership of Coker F. Clarkson. At the Dayton meeting papers will be presented on the following subjects:

The question of Long- versus Short-Stroke Motors, by Justus B. Entz.

Long Addendum Gears, by E. W. Weaver.

Elements of Ball and Roller Bearing Design, by Arnold C. Koenig.

Worm Gears and Wheels, by E. R. Whitney.

Rotary Valve Gasoline Motors, by C. E. Mead.

Oversize Standards for Pistons and Rings, by James N. Heald.

Some Points on the Design of Aluminum Castings, by H. W. Gillett.

During the afternoons the members and guests attending the meeting will witness aeroplane flights at the Wright Brothers' grounds, ball games and band concerts and visit and inspect about twenty of the largest manufacturing companies in Dayton, most of whom make commodities of interest to automobile engineers. Automobiles will transport the members and guests from the hotels to the various places as desired. On one evening the S. A. E. members will attend a theatrical performance in a body. Another evening will be devoted to discussing subjects relating to commercial motor vehicles.

One of the automobile 'buses which have replaced the horse-drawn omnibus line between the St. Lazare depot and Pl. St. Michel in Paris

United States Motor Officers View 1912

DETROIT, MICH., May 23—At a meeting of many of the officers of the United States Motor Company held recently in this city to consider and pass upon the models to be manufactured by the component companies of the corporation during the year 1912, President Briscoe said that the production of 1911 would be about 30,000 cars and trucks and that he did not look for that figure to be exceeded in 1912. Mr. Briscoe said that business was excellent and that the new models would not be announced before the end of July, as he considered announcing forthcoming models before the end of the manufacturing season a mistake. The following officers attended the meeting: Benjamin Briscoe, president; Frank Briscoe, vice-president; J. W. Wellington, vice-president; Alfred Reeves, sales manager; A. I. McLeod, central supervisor; O. J. Mulford, Gray Motor Co.; C. S. Briggs, Brush Runabout Co.; Morris Grabowsky; P. H. Breed, Alden-Sampson Mfg. Co.

Apple Co. in Hoosierdom

DAYTON, O., May 22—The Apple Electric Company, of Dayton, Ohio, has opened a branch store and installation agency at 330 N. Illinois St., Indianapolis, Ind. The agency is in charge of Messrs. Montfort and Brown.

Detroit Drives Automobiles from Street

DETROIT, MICH., May 24—Trying to place Detroit in the same status as that enjoyed by Akron, O., and other places as regards the vexations and unreasonable restraint of automobile operation, that funny little organization, the Common Council of Detroit, has passed unanimously the Littlefield ordinance.

This measure provides that automobiles must stop before crossing car tracks; must stop before passing street cars that are engaged in loading and unloading passengers; makes 12 miles an hour the limit within a circle having a radius of one mile and 15 miles an hour outside that section. Passing a street car on the left means a term in jail and an equally drastic penalty is provided for infraction of any of the other prohibitions.

Detroit motordom is not exactly overjoyed with the Littlefield ordinance. It was fought hard in committee but without the slightest effect upon the far-sighted statesmen who make the laws for the center of the automobile manufacturing industry.

The effect of the law will be to drive all automobiles from the streets where there are street car tracks. Such a legal blow has never been struck at the industry before in any big city since the day the automobile demonstrated itself as an element in human progress.

The retail trade in Detroit is in mourning and the manufacturers are not smiling to-day.

It may be recalled that Detroit recently spent a vast sum in erecting a drinking fountain to the memory of one of her citizens, but to date there is nothing like an adequate convention hall to accommodate national meetings and the experience embodied in the last automobile show in Detroit is still quite painful.

Ford Wins Washington Sociability

WASHINGTON, D. C., May 22—A Ford roadster, driven by H. G. Machen, carried off the honors of the Four Leaf Clover sociability run of the Automobile Club of Washington, May 15-18, by winning the sweepstakes trophy and the trophy in Division 1A. It had three points against it for a motor stall. The other winners were as follows: Division 2A, Regal roadster, driven by E. H. Clarke, 126 points; Division 3A, Warren-Detroit, I. C. Barber, 55 points; Division 4A, Velie, C. E. Miller, 88 points; Division 5A, Stoddard-Dayton, Clarence Barnard, 205 points.

Twelve cars started in the event, which covered about 500 miles in the four days, the start and finish of each day's run being in Washington. An Apperson, Krit and Hudson were withdrawn on the second day. The scores of the other cars were: Buick, 302 points; Marion, 1,871 points; Cole, 242 points; Reo, 163 points.

New "Palace" Opens Doors

The new Grand Central Palace, located on Lexington avenue between Forty-sixth and Forty-seventh streets, has been formally opened and is now the scene of the New York Architecture and Building show. The building is thirteen stories high and the main floor and the two above it are used for exhibition purposes, having a large opening which converts the two upper floors into balconies.

Pope Leaves Midland Co.

MOLINE, ILL., May 22—Charles H. Pope, president and general manager of the Midland Motor Company, has resigned after a business career covering 42 years. His successor has not been named as yet.

Seeking Trade in Oklahoma

OKLAHOMA CITY, OKLA., May 22—D. S. Menasco, vice-president and sales manager of the American Motor Company of Indianapolis, spent three days in this city during the past week as the guest of J. W. Densford, who has organized the American Motor Sales Co. to handle the American line of cars in the State.

Mr. Menasco sold several Americans here last year and believes that with the new models he will be able to do an extensive business. A first-class salesroom will be opened in the near future.

O. B. Little, representing the Southern Motor Works of Memphis, makers of the Marathon car, has been in Oklahoma City several days looking over the territory and seeking to locate a State distributing agency here.

New Quarters for Overland Engineers

TOLEDO, O., May 22—The engineering department of the Willys-Overland Co. will be installed in a new building by July 1. The new structure will be modern in every respect and will add much to the efficiency of the manufacturing plant.

The contract for the other immense structures planned for this company has been let to W. E. Wood, of Detroit. These will have a floor space of 600,000 square feet. The capacity of the new plant will be 30,000 automobiles a year.

Falcars Are Out of the Big Race

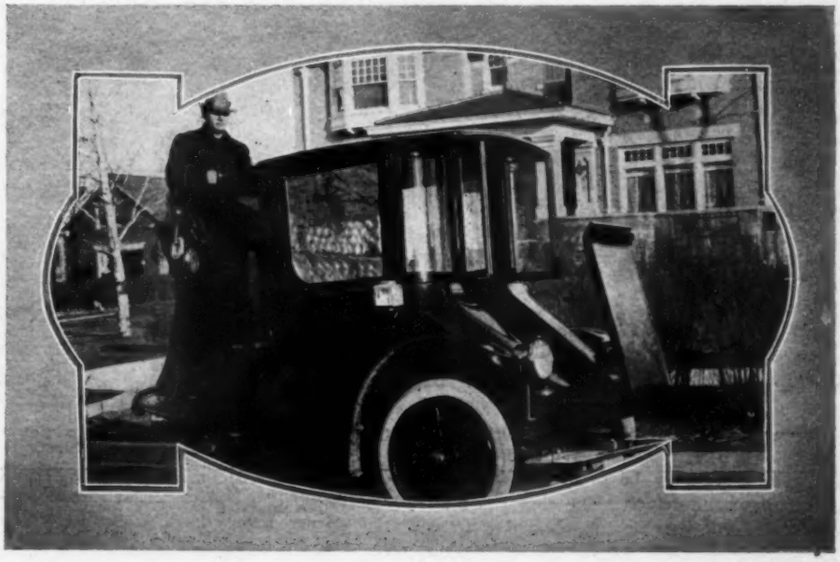
CHICAGO, May 22—The Fal Motor Co. to-day made the announcement that it will be impossible for its two entries in the 500-mile race at Indianapolis to start because of the failure to receive in time the axles that had been ordered.

Ohio Motor Car Company Enlarges

CINCINNATI, O., May 22—The Ohio Motor Car Co. has applied to the Secretary of State for an increase of capital to $450,000, $250,000 being common stock and $200,000 being preferred stock.

Ashburnham Home of Almond Company

The T. R. Almond Manufacturing Company has its place of manufacture at Ashburnham, Mass., rather than Ashburton, as stated in THE AUTOMOBILE of May 25.



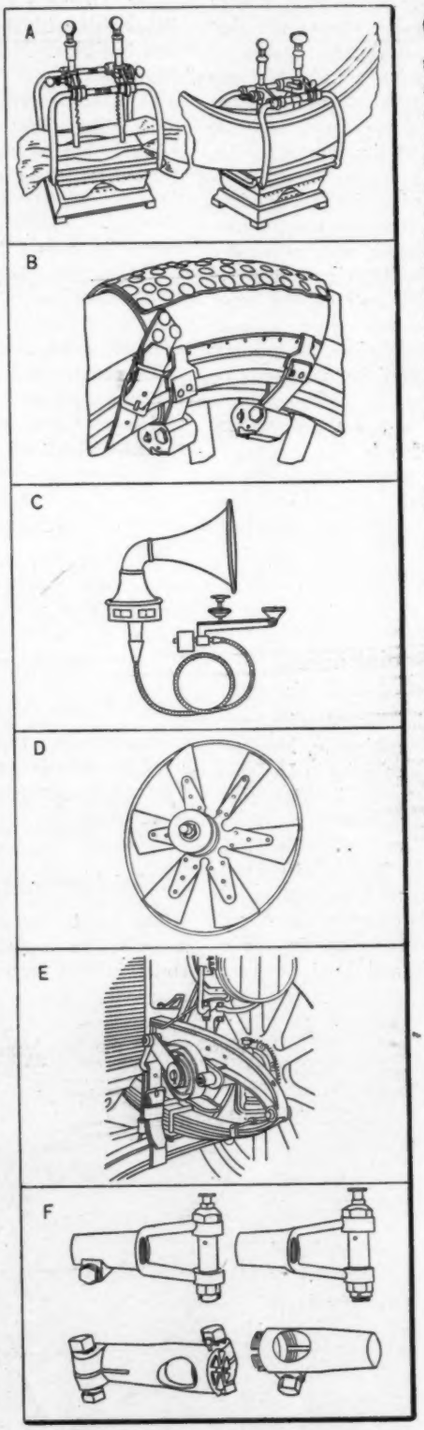
Wagenhals three-wheel hansom taxicab—caught by the camera on the streets of Detroit

Seen in the Show Window

VULCANIZING seems to be quite a simple undertaking, but more than one novice has found out the fallacy of this idea. The Vulcar vulcanizer, using alcohol for heating, is automatic, which makes it a very attractive device for the beginner as well as the experienced autoist. As the illustration (A) shows, the casing or tube to be repaired is placed on the device, the area of which is 5 by 8 inches, and the alcohol burner contained in the apparatus is lighted. After twenty minutes the process of vulcanizing is complete, and during this time the driver need in no way pay any attention to tire or machine. Alcohol, as a fuel, supplies the necessary moisture so that over-vulcanizing is avoided. The device is made by the New Process Vulcanizer, 3232 Monroe Street, Toledo, Ohio.

BLOWOUTS are frequent experiences, considering the army of automobilists as a whole, and each of them will meet with such a mishap at some time or other. The operator of a car, especially of one that is doing touring work, and who is prepared to come to tire grief at some time, will welcome the arrival of an emergency sleeve for such cases. The "Universal" detachable and full tread as shown at (B), which is guaranteed to last through 5,000 miles, is put on in a moment and adjusted to proper tension by means of a small wrench. The "Universal" serves as well as an emergency sleeve, as it does work as a tire protector in general, and it fits all makes of tires.—The Universal Tire Protector Co., Angola, Indiana.

THERE is reserve power in every automobile engine while it is running, and since there is no necessity for a horn while the car is not in motion, some merit must be found in the idea of utilizing the surplus of the engine's power to operate the horn which notifies pedestrians and drivers of the coming of the automobile. This principle was carried out in the construction of the "Uncas Siren Horn." The siren in the horn which is illustrated at (C) is actuated by the motion transmitted to the device through the shafting, no other connections or energies of any kinds being required to realize the proper work from the horn. It will always work as long as the engine is in working order. The strength of the sound may be greatly modified at the will of the driver. The signal is manufactured by the Sterling Machine Company, of Norwich, Conn.



(A) Applying Vulcar Vulcanizer to a tire
(B) How the Universal Emergency Sleeve is attached to a damaged tire
(C) Uncas Siren Horn, actuated by the motor
(D) Giving an idea of the lightness and strength of the S-W Fan
(E) Skinner Recoil Check applied to a car
(F) Four types of Billings & Spencer steering connections

OVERHEATING is one of the dangers facing the autoist when the conditions of proper cooling are left out of consideration, and its symptoms are as numerous as they are disagreeable. It stands to reason that the fan is an important factor in the cooling of the circulating water, and in the illustration (D) an efficient design of fan, produced by the Sparks-Withington Co., of Jackson, Michigan, is shown. Blades are one-piece stampings and hub and spider are made of pressed steel, thus presenting a light and strong blowing device. Among the other products of the company may be mentioned ball bearings, battery boxes, brake drums, hub caps, flanges and complete hubs.

SPRINGS are rather expensive articles, as those know woh have had some opportunity to replace a broken set. They who have wrung their hands over an accumulation of repair bills in this department will be interested in the Skinner Recoil Checks illustrated at (E) which, while they do not serve as checks to pay the bill once received from the repair man, will check his further efforts in this direction. This they do by checking—hence the name—a too sudden recoil of the spring to which they are attached, forming a connection with the axle the spring rests upon. These recoil checks may be attached in ten minutes' time, and the manner of attachment is clearly shown in the figure. No holes have to be drilled in this process, and while breakage is prevented, the easy riding qualities of the cars are increased by these checks, made by the Skinner & Skinner Co., of 1714 Michigan ave, Chicago.

AS lost motion in a steering system may have the same disastrous effect as intoxicants in the man who holds the wheel, nothing need be said about the necessity of incorporating the best material and workmanship in all parts of the steering system, not forgetting that the cheapest example of this type of machinery will in course of time prove not only as the least efficient but also as the dearest. In Fig. (F) four types of steering connections are shown. Produced by standardized methods of manufacture and ready to be applied to any modern car, they have constituted part of many of the best renowned machines of this country for a number of years, since the name of their maker, the Billings & Spencer Company, of Hartford, Conn., has proved a reliable guarantee. The B. & S. steering connections are made in four sizes in sets of five types.